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ON ANÆSTHESIA AND NARCOSIS*

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Modern anæsthesia may be said to date from the year 1880, when Sir Humphrey Davy in his book on "Researches on Nitrous Oxide," made his famous historical prediction, which is as follows:—"Since nitrous oxide seems capable of destroying physical pain, it may be used in surgical operations where there is no great effusion of blood"—a suggestion which, by the way, was not made use of for nearly half a century. In 1818 in the *Quarterly Journal of Science and Arts*, a paragraph attributed to Faraday, pointed out that "when the vapour of æther is mixed with common air and inhaled, it produces effects very similar to those occasioned by nitrous oxide."

In 1842, æther was first used to produce anæsthesia, by Crawford Long; two years and eight months later, Horace Wells used nitrous oxide as a dental anæsthetic, and in 1846 Morton gave his first public demonstration of æther anæsthesia.

On November 10th, 1847, Simpson first used chloroform as an anæsthetic in his midwifery practice.

Since its introduction, the Science and Art of Anæsthesia has made considerable progress. At first the three chief anæsthetic agents used were:—nitrous oxide, æther and chloroform; and improvements were made in methods of administering them, and in apparatus for their administration. Later, fresh anæsthetic substances were introduced, some of which have been retained, others discarded as being uncertain in their action or dangerous for use.

Amongst the most recently introduced anæsthetic substances are:—avertin, nembutal, sodium amytal and pernocton.

Schraff in 1862 discovered the local anæsthetic effect of cocaine when placed upon the tongue; Koller in 1884 applied this discovery to surgical purposes, and used it to anæsthetise the eye; the adoption of this method created a new era in local anæsthesia. Infiltration and spinal anæsthesia were made possible by Alexander Wood, who in 1853 introduced the hypodermic syringe, and thus offered a new means of applying solutions to sensitive parts.

The toxicity of cocaine was soon recognised, researches were made, and numerous less toxic local anæsthetics were discovered, amongst which may be mentioned:—eucaine, novocain, stovaine and percaine.

The first successful experiments upon animals for the purpose of rendering them insensible to pain by means of the inhalation of gases, were made by Henry Hill Hickman between the years 1820 and 1828. He commenced a series of experiments on animals, first by producing semi-asphyxiation by the exclusion of atmospheric air; then, by causing them to inhale small quantities of carbon dioxide. After rendering the animals unconscious, he excised the ears, amputated their legs, made incisions, then dressed the wounds, noted the time they took to heal, and the period of their complete recovery. In these experiments he met with considerable success, and was convinced that if his methods were applied to the human subject they would be of the greatest value in making painless the performance of surgical operations. His notes of these interesting experiments are still extant in his own handwriting, and it might be of interest if I quote you one or two of them.

"*First Experiment.*—I took a puppy a month old and placed it on a piece of wood surrounded by water, over which I put a glass cover so as to prevent the access of atmospheric air; in ten minutes he showed great marks of uneasiness; in twelve, respirations became difficult and in seventeen minutes ceased altogether; at eighteen minutes I took off one of the ears, which was not followed by hæmorrhage. Respiration soon returned and the animal did not appear to be the least sensible of pain; in three days the ear was perfectly healed.

"*Second Experiment.*—Four days after, the same puppy was exposed to a decomposition of the carbonite of lime by sulphuric acid. In one minute respiration ceased. I cut off the other ear, which was followed by very trifling hæmorrhage, and, as before, did not appear to suffer any pain; in four days the wound healed. The day after the operation he seemed to require an additional quantity of food, which induced me to weigh him, and I found he gained 9 oz. 8 dr. and 24 grains in nine days.

"*Third Experiment.*—I took the same puppy and proceeded as in experiment 1st, and respiration was acted on in much the same manner. I cut off the tail and made an incision over the muscles of the loin, through which I passed a ligature and made it tight. No appearance of uneasiness until the day following, when inflammation came on and subsequent suppuration. The ligature came away on the seventh day, wound healed on twelfth, and the dog is

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remarkably increased in size and now perfectly well.

"*Fourth Experiment.*—A mouse was confined under a glass, surrounded by water; by means of a small tube a foot long, I passed carbonic acid gas very slowly prepared into the glass. Respiration ceased in three minutes. I cut off all its legs at the first joint, and plunged it into a basin of cold water, the animal immediately recovered and ran about the table apparently without pain: the stumps soon healed and I kept it a fortnight, after which I gave it liberty."

Hickman endeavoured to demonstrate the results of his experiments to the medical profession of his time, but he was met with the greatest scepticism, and his system was generally derided and condemned as dangerous and useless.

The idea is still fairly prevalent that to produce unconsciousness and anæsthesia, all that is necessary is to pour some substance such as æther or chloroform on a mask or towel, and tell the patient to inhale it. Although this "rag and bottle" method will render a patient unconscious and insensible to pain during an operation, it is not the ideal method either for the surgeon or for the good of the patient; with the drugs and apparatus which we now have at our disposal, such methods should be a thing of the past.

I will not presume to tell you anything about veterinary anæsthesia, as my experience in that direction has up to the present been too limited, but will endeavour to give you an outline of what can be done to render an anæsthetic, which everyone dreads more or less, more comfortable and safe for the patient, both during the induction and recovery periods.

Choice of Anæsthetic.

The choice of an anæsthetic is of the utmost importance; it depends upon age, general condition of the patient and the type of operation to be performed. For a short minor operation only a short anæsthesia is necessary, and ethyl chloride, or nitrous oxide will answer the purpose; but for a prolonged operation, a long anæsthesia is required which necessitates the use of such substances as æther, chloroform, ethylene, or nitrous oxide and oxygen.

The whole art of safe anæsthesia is comprised in careful attention to details, and there are certain cardinal points which must not be disregarded:—

(1) *Absolute certainty that the right drug is being given and administered in the correct manner*:—for example, chloroform should never be given to a patient in the sitting position; its use should also be avoided in patients suffering from such a disease as diabetes, where chloroform would tend to aggravate the condition.

Æther should not be given to patients suffering from acute chest conditions, such as bronchitis or pneumonia, or where there is acute kidney disease; its use should also be avoided in cases where the cautery is to be used, owing to the explosive nature of its vapour when mixed with air. Nitrous oxide should not be given where there is any respiratory obstruction, or to patients with marked arterial degeneration.

(2) *Overdosage must be avoided.*—No definite rules can be given as to the quantities of anæsthetic which should be given; a strong man will require considerably more than a fragile girl; young children, as a rule, require a larger dose in proportion to their weight than do adults during the induction stage; but on the other hand they "go off" quite suddenly, and from this period onwards require very little anæsthetic to keep them relaxed. The phenomenon which is termed "The Law of Diminishing Resistance" should be borne in mind. This law states that:—"As time proceeds, a patient requires an ever diminishing dose of anæsthetic to keep him at a constant depth of narcosis." Close attention to the three cardinal signs of anæsthesia—(1) automatic respiration, (2) complete muscular relaxation and (3) absence or diminution of reflexes—will greatly minimise, even abolish, the possibility of the patient being given an overdose of anæsthetic.

(3) *The maintenance of a free airway.*—If the airway is kept freely open so that respiration is unobstructed, at least fifty per cent. of the anæsthetist's troubles will never occur. An aphorism which is well worth remembering (culled from a *St. Bartholomew's Hospital Gazette*) is as follows:—"Take care of the airway, and inquests will take care of themselves."

A patient about to have an anæsthetic may be said to have four periods or stages to pass through before returning to the normal state:—

1. The period of preparation and premedication.
2. The period of induction of anæsthesia.
3. The period of maintenance of anæsthesia.
4. The period of recovery.

The Period of Preparation.

(*a*) The risk of operation is minimised if the patient is properly prepared; this applies not only to man but also to animals, and due attention must be paid to the condition of the heart, respiratory and digestive organs. The heart should be examined and the presence or absence of valvular or myocardial disease noted; the condition of the heart muscle is of much greater importance than a valvular defect. The lungs should be examined for any evidence of bronchitis, pneumonia or tuberculosis. As regards the digestive system, the old method of preparation was to subject a patient to an elaborate

method of starvation, purgation and enemata—this is quite unnecessary and in some cases harmful; a patient should be in the best possible condition before an operation, violent purgation and starvation must make a drain upon his vitality: a nervous patient will dread this preparation more than the actual operation, and the consequent sleepless night will not improve his condition, and it has been shown that a loss of body fluids owing to a too stringent preparation may be a causative factor in post-operative pulmonary embolism, and in acidosis. In the preparation of a patient for an average operation, it is only necessary that: (1) there should be no solid food in the stomach at the time of operation; (2) the bowel should be sufficiently empty to avoid the necessity for an aperient until two days after the operation without any symptoms of intestinal toxæmia appearing, and to avoid the possibility of an accidental evacuation on the table.

These conditions can be met by giving the patient a light, easily digested diet, and a series of moderate purges over a period of two or three days before operation. Fluids may be given until within a few hours of operation. The last fluid given should not be milk, as clots may continue for some time in the stomach, thus violating our first condition, *viz.*, that there should be no solid food in the stomach at the time of operation. Children may be given a stick of barley sugar (glucose) to suck until immediately before the anæsthetic is due; it will help to keep them quiet, and diminish their after sickness.

(*b*) Preliminary Medication.

In pre-anæsthetic days, it was the custom to dull the patient's sensibility to the pain of an operation by means of large doses of alcohol, opium and other narcotic drugs. In the middle of the nineteenth century when respirable anæsthetics were introduced, it is not surprising that the new methods were engrafted upon the old, and a combination of narcotics and anæsthetics utilised. This method was slow in gaining favour, probably owing to overdosage of the narcotic and inexperience in the use of the respirable anæsthetic, producing unfavourable symptoms.

In 1863, Nussbaum employed morphia in conjunction with chloroform, and found that patients thus treated remained in a deep sleep for a considerable time after the withdrawal of the chloroform, and then woke without nausea or vomiting. About the same time, Claude Bernard observed similar effects in dogs; his researches were published in the *Lancet* in 1869. Nussbaum's object in giving the morphia was to lessen the after pain of operations; but Claude Bernard gave it with the object of facilitating the action of chloroform, and rendering smaller quantities of the anæsthetic necessary.

The advantages of using narcotics as a preliminary to general anæsthesia are:—(1) the element of fear is eliminated, and the patient is in a somnolent or apathetic condition before the anæsthetic is administered; (2) the period of excitement in the second stage of anæsthesia is absent; (3) the amount of anæsthetic necessary to produce complete relaxation is considerably diminished; (4) there is a diminution of the secretion of mucous and saliva, especially if æther is being used; (5) shock is lessened, and there is less tendency to vomiting and to pulmonary complications; (6) after the operation the patient has a long period of insensibility with freedom from discomfort and pain.

BASAL NARCOSIS

This method of administering drugs, whereby a patient is rendered unconscious before the administration of the anæsthetic, is termed basal narcosis.

In 1913, Gwathmey introduced his method of inducing narcosis by the injection of an oil æther solution into the rectum; the amount of æther given was calculated by the weight of the patient, an ounce of æther being used for every twenty pounds of the patient's body weight. The amount of æther required was mixed with two ounces of olive oil, and slowly injected into the rectum; the injection was given with the patient still in his bed. In about twenty minutes he was brought to the theatre in a state of light anæsthesia, free from mental distress and pre-anæsthetic fear.

Although this method has its disadvantages, it marked a great step forward in anæsthesia. Later he added paraldehyde to the oil-æther mixture, and this method marked the birth of basal narcosis as it is known to-day.

Numerous basal narcotics have been introduced since then, and I propose to give you a short account of a few of them, *viz.*, paraldehyde, avertin, nembutal and pernocton.

Paraldehyde.

Paraldehyde alone will not produce unconsciousness, except in the case of very young children, and old, feeble patients, and it is necessary to supplement it with morphia, or some anæsthetic such as nitrous oxide and oxygen, or æther. The dose given is one drachm of paraldehyde for every stone of body weight, dissolved in ten drachms of warm saline solution, given slowly through a catheter into the rectum, the bowel having been washed out two hours previously. In about 25 to 30 minutes after the injection, the patient falls asleep, and only a very small amount of inhalation anæsthesia is required during the course of the operation. In some cases the patient will not retain the rectal injection, but if a 10 grain chloretone suppository be given, this difficulty is overcome. Pre-medication with paraldehyde

in cases where young children have to be operated upon, is an extremely useful method.

Avertin. (*Tri-brom-ethyl-alcohol.*)

In 1926, Professor Eichholtz introduced avertin. A much more powerful drug than paraldehyde, it lacks the disagreeable odour of that drug, and has the advantage that it is only necessary to inject a small volume of the solution into the rectum. Avertin is a white crystalline powder, soluble in 1-28 of water. The dose given varies from about 0·05 grams per kilogram of body weight to 0·15 grams; the average dose being 0·1 gram per kilo. Avertin is now made up in solution which is kept stable by the addition of amylene hydrate; each cubic centimetre of the solution contains 1 gram of avertin; from this a 2½ per cent. solution is prepared with distilled water at a temperature of 35 degrees centigrade. If heated above 40 degrees, it is decomposed; hydrobromic acid is split off, and di-brom-acetaldehyde is produced, which will cause injury to the rectal mucous membrane; therefore immediately before use it must be tested to see that no decomposition has taken place. For this purpose 2 drops of 1-1,000 Congo-red solution are dropped into 5 c.c. of the avertin solution. It should remain an orange-red colour—if there is any trace of a blue colour it is an indication that decomposition has taken place, and the solution must not be used. Avertin is very quickly absorbed by the intestinal mucous membrane; in about five minutes the patient falls into a natural sleep, excitement is rare, narcosis deepens for another 10 or 15 minutes, and the patient is completely relaxed.

After a dose of avertin there is marked slowing of the respiration, and as his muscles are relaxed, he must be carefully watched to see that there is no obstruction to the airway. Breathing can be improved by the injection of 1/20th of a grain of a-lobelin, or by the inhalation of carbon di-oxide and oxygen.

The heart and blood pressure are hardly affected by a narcotic dose of avertin; a serious fall of blood pressure and circulatory collapse is caused by an overdose.

Avertin is eliminated chiefly through the kidneys, therefore its use is contra-indicated in cases of severe renal disease. It should be used with caution in cases of liver disease, acidosis, serious blood disease and cases of grave pulmonary tuberculosis.

Recovery of consciousness usually occurs in from one to four hours, the period largely depending upon the amount of inhalation anæsthetic used. Restlessness, vomiting, and post-anæsthetic headaches are rare, and the patient wakens up as from a normal sleep. Avertin can be used very successfully as an anæsthetic for dogs, rabbits, etc., but of all the laboratory animals, the cat seems to be the most sensitive to avertin.

Nembutal. (*Sodium-ethyl-methyl-butyl-barbiturate.*)

Nembutal, one of the barbituric acid derivatives, has a profound sedative but short hypnotic action. Experimentally it has been shown that 30 to 45 milligrams per kilo. given intraperitoneally, intravenously, or orally produce, in dogs, an adequate surgical anæsthesia with complete relaxation of 2 to 2¾ hours' duration, and recovery in about 4 hours; there is practically no stage of excitement, or delirium.

Nembutal is usually given either by the mouth, or intravenously; used as a basal narcotic, it it comparatively easy to judge the necessary dose, especially if given intravenously; but if used with the intention of producing anæsthesia, it is very easy to administer an overdose.

If given by the mouth, the usual dose is 3 grains of nembutal together with a hypodermic injection of morphia gr. 1/6, and atropine gr. 1/150, given 35 to 40 minutes before operation; by this time the patient is in a drowsy or somnolent condition, and a very small amount of anæsthetic is all that is necessary during the operation. Morphia given with nembutal increases its action, and reduces the amount of nembutal necessary to produce unconsciousness.

The intravenous method of administering the barbiturates is easy, and the minimal dose can be gauged with accuracy. The method of administration is as follows:—a 5 per cent. solution of nembutal in sterile distilled water, is made up. For the injection a 10 c.c. syringe, fitted with a fine hypodermic needle, is used. The needle is inserted in one of the large veins of the arm, and the nembutal solution slowly injected into the blood stream at the rate of about 1 c.c. per minute, As the injection proceeds, the patient's speech becomes blurred, and finally he sinks into a deep sleep. As soon as he loses consciousness the administration is stopped. In this way correct dosage is assured. Usually very little inhalation anæsthetic is needed, though patients vary in this respect, but even if æther is the anæsthetic used, vomiting is practically unknown.

Recovery takes place in from two to six hours, followed by a lengthy period of drowsiness, which may last as long as twenty-four hours.

Pernocton. (*Sodium salt of secondary butyl-B-brom-allyl barbituric acid.*).

Pernocton is similar in its action to nembutal; it is best given intravenously, the average dose being 3 to 5 c.c. of a 10 per cent. solution.

The barbiturates are probably eliminated by the kidneys after having been broken up in the liver; they are therefore contra-indicated where there is a grave disease of these organs. Other dangers which may arise from the use of barbiturates are—post-operative pulmonary œdema, broncho-pneumonia, and rarely pulmonary

embolism; but only following large doses of the drug. If it is considered necessary, patients can be aroused from their sleep by a subcutaneous injection of caffeine sodium salicylate, or benzoate (3 gr. dissolved in 1 c.c. of sterile distilled water), or by the inhalation of carbon dioxide and oxygen, given immediately after the operation.

A certain amount of experience is necessary before the best results can be obtained by the use of these drugs, but a little trouble and care expended is well worth while for the benefit of a patient about to undergo an operation.

2. The Period of Induction.

The period of induction of anæsthesia extends from the time the anæsthetic is commenced, until the third stage, or stage of surgical anæsthesia has been reached.

If an adequate preliminary hypodermic injection has been given at the proper time before the anæsthetic is due, a half to three-quarters of an hour before operation; or if a basal narcotic has been given, the induction of anæsthesia presents no terrors or discomforts to the patient, and simplifies the task of the anæsthetist.

The patient should be kept as quiet as possible, and there should be no noises or talking in the room in which the anæsthetic is being administered. As a patient is being anæsthetised, he first passes through a stage of disordered mentality; before consciousness is lost, sound and touch impressions are much magnified and distorted by the patient and tend to alarm him, and interfere not only with a tranquil induction period, but also with the maintenance of a good anæsthesia. As the anæsthesia proceeds, the second stage, or stage of excitement is reached; the excitement may be more or less marked. If the patient is violent, he should be just sufficiently restrained to prevent him injuring himself or falling off the table; he should not be forcibly held down, as this will only tend to make a semi-conscious patient struggle the harder. The length of the period of excitement varies in different patients; in those who have had a preliminary narcotic, it is often entirely absent. As anæsthesia proceeds, the third stage, or stage of surgical anæsthesia is reached, the signs of which are:—automatic respiration; complete muscular relaxation, and absence, or diminution of, reflexes. When this stage is reached any surgical operation can be performed, and it is never necessary to carry a patient deeper into the fourth stage, or stage of coma.

3. Period of Maintenance of Anæsthesia.

During the period of maintenance, the patient must be carefully watched; every breath should be seen, heard, or felt, and no obstruction to the respiration should be allowed to occur. The pulse and colour of the patient must also be watched the whole time. The anæsthetist should always know what stage of the operation the surgeon has reached, so that he can regulate the depth of anæsthesia accordingly, but should never become so engrossed in the operation that he forgets the patient.

Anæsthetic emergencies arise very suddenly at times, and the anæsthetist must always be ready to deal with them immediately, or to anticipate their occurrence. The signs of commencing shock should be noted—such as marked pallor of the patient, small rapid pulse, irregular gasping respirations, fall of blood pressure, and subnormal temperature; and means should be taken to combat this condition: the operation should be finished as soon as is possible, and intravenous injection of saline, gum saline, or a blood transfusion employed to tide the patient over his period of shock.

During the period of maintenance, the depth of anæsthesia should be regulated according to the requirements of the operation; and the expert anæsthetist will use the minimum amount of anæsthetic to produce the maximum depth of anæsthesia.

The smaller the amount of anæsthetic used, the quicker it is eliminated; and it is possible so to regulate the dose of anæsthetic that the patient is just beginning to regain consciousness as the dressings are being placed on the wound.

4. Period of Recovery.

Volatile anæsthetics are excreted by the lungs, and the length of time it takes a patient to recover from an anæsthetic depends upon the amount of anæsthetic used, the fixity or looseness of its combination with the hæmoglobin in the red corpuscles and other tissues, and also upon the rate and depth of the respirations. Normally the lungs are kept expanded and their air passages open by the tonus of the diaphragm and other respiratory muscles; when muscle tonus is lowered, as it is after an anæsthetic, the vital capacity of the lungs is lowered, mucus accumulates and some of the airways are filled and blocked up. As soon as any part of the lung is shut off, the air within it is quickly absorbed into the blood, and that area becomes collapsed. It is in such areas that any bacteria which happen to be present find favourable conditions for their growth, and it is in this way that pneumonias following anæsthesia, develop. During anæsthesia, the respiratory centre is depressed; to hasten the recovery of a patient, and to prevent post-anæsthetic pulmonary complications, our object should be to restore the respirations to normal as soon as possible: this can only be done by restoring the activity of the depressed respiratory centre.

Under normal conditions the centre is stimulated direct by the five per cent. carbon dioxide in the circulation. Yandell Henderson has shown that, following anæsthesia, or the use

of a narcotic, this percentage of carbon dioxide is insufficient, and from seven to 10 per cent., or even higher percentages may be needed. In order to stimulate a patient's respiration an inhalation of carbon dioxide and oxygen is given, the percentage of carbon dioxide being regulated by the requirements of the patient; the inhalation is continued until the respiratory centre has returned to normal. So, by giving a mixture of carbon dioxide and oxygen or air to a patient after an operation, we hasten the elimination of the anæsthetic, diminish nausea, promote a vigorous heart action, and prevent to a very great extent, the possibility of the occurrence of a post-anæsthetic pneumonia.

The respiratory centre can also be directly stimulated by an intra-muscular injection of a-lobelin gr. 1/20. Lobelin was discovered by Wieland in 1915; it is a direct stimulant of the respiratory centre, and is extremely useful in cases where the respirations are slowed by a preliminary injection of morphia; within a minute of an injection of lobelin being given the respirations are improved both in rate and volume.

When the patient is returned to bed after operation, he should be made as comfortable as possible; if he has been perspiring, he should be briskly rubbed down and his damp clothing changed; warmth should be supplied by the use of hot bottles; his head turned on one side so that any mucous secretion or vomit may fall into the dependant cheek, and run out of the side of the mouth, and not down into his trachea; the jaw should be kept well forward to prevent the tongue falling against the back of the pharynx, causing obstruction to his respiration, and, if the patient is suffering from shock, the condition should be treated. Glucose, 10 per cent., can be given *per rectum*, and when the patient is sufficiently conscious, he may be given a glucose solution to sip, if the nature of the operation permits it.

It is a good plan to give glucose after any anæsthetic, especially where there has been a heavy loss of blood, where the patient shows signs of shock—cerebral, pulmonary, or splanchnic—or where it has been necessary to use more than the usual amount of anæsthetic.

LOCAL ANÆSTHESIA

In addition to general anæsthesia, the production of a local anæsthesia occupies an important place in the armamentarium of the anæsthetist.

The endeavour to render operations painless by inducing local anæsthesia, is almost as old as medicine itself. From the most ancient times physicians have, in addition to their attempts to carry out operations painlessly by some method of dulling the senses, endeavoured also by some local application to secure anæsthesia of the site of operation.

The different ways in which local anæsthesia was sought to be attained are briefly as follows:—the application of crocodile fat; friction with vinegar and stone of Memphis; the production of anæsthesia by the compression of nerves (was practised by the Arabs); by the application of cold; by electricity, using rhythmic currents (the so-called Le Duc's currents); and finally by chemical means.

The first monographs on the use of cocaine hypodermically in surgical operations appeared almost simultaneously in Germany, Austria and the United States in 1885. The most important of these papers is that of Corning, in which he establishes two significant facts: (1) the heightened effect of cocaine in tissues emptied of blood, and the consequent possibility of obtaining satisfactory results by the injection of very dilute solutions; (2) the possibility of interrupting conduction in sensory nerves by cocaine injections—an observation which formed the foundation of the method of conduction anæsthesia. The toxity of cocaine was very soon discovered—but experimental chemistry has furnished us with substitutes for the poisonous cocaine, which, while considerably less toxic than that substance, are as effective as anæsthetics.

Except for operations on mucous membranes and the eye, cocaine is not now used as a local anæsthetic.

For injection into tissues, spinal anæsthesia, etc., we have a large number of anæsthetic drugs at our disposal. Amongst those in general use are—novocain, stovaine, spinocain and percaine.

Novocain (*para-amino-di-ethyl-amino-enmnol hydrochloride*).

Novocain is a synthetic preparation; it is freely soluble in water, and can be heated to 120 degrees centigrade without decomposition; its toxicity is one-fifth to one-seventh that of cocaine. The solutions used for local infiltration and nerve block vary from a half to two per cent., and large amounts can be used with safety. It is not quite as powerful an anæsthetic as cocaine, and does not, like cocaine, cause a local anæmia; when this effect is desired therefore, adrenalin must be added to the solutions. It produces no local irritant effects when injected into the tissues.

Stovaine (*Benzoyl-ethyl-di-methyl-amino-propanol hydrochloride*).

The action of stovaine is the same as cocaine except that it is less toxic, and also less powerful. It has a distinct irritant effect locally; it is therefore unsuited for local anæsthesia. It is soluble in water 1-14, its solutions withstand boiling, but are decomposed when heated to 120° C. The doses used to produce spinal anæsthesia are—for the child ½ gr. up to 1½ grs.

for an adult. Stovaine should not come in contact with alkaline solutions, which neutralise its effects.

Spinocain (*Pitkin's Solution*).

Spinocain is used entirely for spinal anæsthesia. Two solutions are employed. The first contains in each 1 c.c., ephedrine hydrochloride 5 per cent., and novocain 1 per cent., the novocain being used to anæsthetise the skin before the spinal needle is introduced, and the ephedrine to prevent the fall of blood pressure which occurs during spinal anæsthesia. The second solution, for producing the spinal anæsthesia, is a special solvent consisting of alcohol and sterile water, with the addition of an amylo-prolamin combination, in each 2 c.c. of which are dissolved 200 milligrams of novocain, and 2·2 milligrams of strychnine sulphate. Spinocain is of lighter specific gravity than the cerebro-spinal fluid, and should never be given with the patient in a sitting position, owing to the danger of it spreading up to the medulla and paralysing the respiratory and circulatory centres.

Percaine (*a-butyl-oxy-cinchoninic acid, di-ethyl-ethylene-di-amide*).

Percaine is a derivative of quinoline, and therefore related to quinine; it belongs to a group of substances not hitherto known to possess anæsthetic properties.

Percaine is readily soluble in alcohol and water, with which it forms neutral solutions. Percaine is a very powerful anæsthetic with a prolonged action; it can be used for local or spinal anæsthesia, very dilute solutions being used, varying from 1-2,000 to 1-1,000 according to requirements. The solution frequently used for spinal anæsthesia is 1-1,500, the dose varying from 5 to 20 c.cs., depending upon the level of anæsthesia which is required.

Local anæsthesia is now produced in four ways:—

1. The application of a solution to a mucous membrane.
2. Local infiltration.
3. Field block.
4. Nerve block.

(1). *For the anæsthetisation of mucous membranes*, cocaine hydrochloride dissolved in distilled water is used in strengths varying from 2 to 20 per cent. The maximum dose of cocaine is ¾ gr., so the amount of solution which can be used depends upon its strength; owing to its toxicity, it cannot be used for any extensive operation.

Solutions of cocaine do not keep well and should always be freshly prepared. It cannot be sterilised by boiling, as this causes decomposition of the drug. Cocaine when applied to a mucous membrane, in addition to producing loss of sensation, causes a distinct contraction of the blood vessels in the area to which it has been applied; this action is extremely useful in operations upon the throat and nose, excessive hæmorrhage which might obscure the site of operation, being prevented.

2. *Local Infiltration.*—For local infiltration, novocain solutions from 0·5 per cent. to 2 per cent. are those in most general use; large quantities of the solution may be injected if necessary, without fear of producing toxic symptoms, as much as 150 c.cs. of the 1 per cent. solution having been used for extensive infiltration and field block anæsthesias.

When commencing a local infiltration, an intradermal wheal should first be made; this is done by introducing a fine hypodermic needle between the layers of the skin, and injecting a small amount of novocain solution. A white wheal is produced, which is immediately anæsthetic, and it is through this wheal that the needle is introduced and the injection made. Having produced your wheal, the needle is then pushed on into the deeper tissues, and the required amount of anæsthetic solution injected; before making a deep incision, it is necessary to wait from 10 to 15 minutes in order to allow the underlying nerves to become anæsthetised. A certain amount of swelling and discomfort at first results, and interferes with the normal anatomy of the part, and some loss of analgesia occurs with the escape of novocain on incision. This method may be used for superficial incisions and minor operations, such as the removal of sebaceous cysts, lipomata, etc.

3. *Field Block Anæsthesia.* — Using this method, a wall of anæsthesia is created around the part to be operated upon, and its nerve supply blocked. The needle is passed through a wheal, and introduced to the deepest layer of the tissues to be anæsthetised; before injecting the novocain, aspiration is practised in order to see that the needle has not entered a blood vessel; if no blood enters the syringe, the solution is injected. The needle is now partially withdrawn, then re-introduced in different directions, and novocain solution injected in a fan-shaped manner. The needle may then be passed through other wheals until the necessary area has been anæsthetised. When the injections are completed, do not operate immediately —wait and give your anæsthetic time to take effect.

4. *Nerve Block, or Regional Anæsthesia.*—In using nerve block anæsthesia, the injection may be made (*a*) into the tissues around the sympathetic nerve ganglia, called splanchnic anæsthesia; (*b*) around the nerves as they leave the vertebral column, called para-vertebral anæsthesia; (*c*) into the sub-arachnoid space, called spinal anæsthesia.

(*a*) In splanchnic anæsthesia, the large splanchnic nerves, semi-lunar ganglia, and retro-peritoneal tissues are infiltrated with a one per

cent. novocain solution, and the abdominal viscera supplied by the splanchnic nerves anæsthetised. The procedure may be carried out from behind, or in front, after opening the abdomen, having previously anæsthetised the abdominal wall by field block, or in place of a field block the skin incision may be made and the abdomen opened under nitrous oxide and oxygen anæsthesia.

(*b*) In para-vertebral anæsthesia, the injection is made into the tissues around the nerves as they leave the vertebral column, and the nerves bathed in anæsthetic solution. The whole of the area supplied by those nerves around which the injection has been made will be rendered anæsthetic.

(*c*) Spinal anæsthesia is produced by injecting an anæsthetic drug into the sub-arachnoid space, blocking the spinal nerves as they enter and leave the spinal cord. Using this method we are able to produce anæsthesia of the lower extremities and trunk, and if necessary can even extend it to the nipple line.

The injection is made into that part of the sub-arachnoid space which is occupied by the cauda equina; the spinal cord ends at the lower border of the first lumbar vertebræ, and the sub-arachnoid space at the second sacral vertebræ, so that there is a considerable area into which the injection can be made without injuring the cord.

The usual site of the injection is in the space between the third and fourth lumbar spines, the objective being the mid-line of the sub-arachnoid space between the two divisions of the cauda equina. The injection may be made with the patient either sitting up or lying on his side; in either case his back should be well arched in order to produce as wide a space as possible between the spines of the third and fourth lumbar vertebræ.

For making the injection, a needle from three-and-a-half to four inches in length, provided with a stylet, is used. The needle is passed through the skin between the third and fourth spines in a forward and upward direction; as it passes through the ligamentum flavum there is a sudden diminution of resistance, and immediately afterwards the point of the needle lies in the sub-arachnoid space. The stylet is then withdrawn and, if the needle has been correctly introduced, cerebro-spinal fluid will commence to trickle out drop by drop; the anæsthetic solution may then be injected. The needle is then withdrawn, and the puncture sealed with collodion.

The patient now lies on his back; the table is either tilted or kept level, depending upon the anæsthetic drug which has been used. In from five to ten minutes anæsthesia becomes established, and will last from an hour to an hour-and-a-half.

Spinal anæsthesia gives an excellent relaxation for abdominal operations; vomiting is obviated and chest complications are rare. Following spinal anæsthesia, headache may occur, lasting for a day or two, and very occasionally paralysis of the sphincters of the bladder and rectum, lasting for a few days. A few cases have been recorded of permanent paralysis of the sphincters.

The Science and Art of Anæsthesia implies a knowledge of general medicine, pathology, surgery, therapeutics and physiology. The anæsthetist must approach each case with a certain amount of respect, for the possibilities of success as well as failure in each are almost unlimited. Anæsthesia is not contained within any particular mode of administration. To give an anæsthetic is one thing; to practise the art of anæsthesia is another.

The aim of the anæsthetist is not just to get the patient off the table alive, avoiding the coroner's court but depositing him on Lethe's wharf to await the arrival of the boatman Charon. His aim should be to induce a tranquil anæsthesia, maintain it with safety, and so regulate the administration that the patient recovers from the anæsthetic rapidly, with as little discomfort as possible and no ill-effects to retard his recovery.

HIGHLAND AGRICULTURAL SOCIETY

Reports regarding future shows were submitted at the anniversary general meeting of the Highland and Agricultural Society in Edinburgh on January 6th, when it was stated that arrangements for this year's show at Inverness were well advanced. The Society decided to hold their 1934 show in the Glasgow Division, and in view of the fact that that year will mark the 150th anniversary of the formation of the Society, it was suggested that the occasion might be one for the holding of an outstanding exhibition.

Progress in experiments for the elimination of the warble fly was reported, and attention was drawn to the possibility of the musquash, now being bred in this country for fur production, becoming a serious pest.

In the past year the expenditure on educational work amounted to £219 5s. 6d.; on the work in the chemical and veterinary departments, £494 13s. 1d.; on warble fly investigation, £294 0s. 11d.; on the Society's "Transactions," £1,975 13s. 4d.; premiums and medals for local shows and district competitions, £704 3s. 9d.; and certificates and medals for long service, £114 12s. 6d. £753 3s. was given in special grants, including £510 to the Animal Diseases Research Association, which sum included £310 to complete the equipment of a bio-chemical department; £100 to Glasgow Veterinary College; and £100 to the Scottish Agricultural Organisation Society.

* * * * *

Dr. Addison, Minister of Agriculture in the Labour Government, in a recent speech at Norwich, maintained it should be possible to increase home food production by £200,000,000 a year.

A NOTE ON *VIBRIO FŒTUS OVIS* IN THE RAM*

J. B. Buxton, M.A., F.R.C.V.S., D.V.H.

Introduction

The information at our disposal regarding the factors concerned in the spreading of vibrionic abortion in sheep cannot be claimed to be exhaustive. Any evidence, therefore, even of a circumstantial character which tends to broaden our knowledge in this direction is of some importance, especially in connection with preventive measures. The possible significance of the ram in this respect has not been overlooked. The Departmental Committee on Epizootic Abortion stated in their final report (Part III, page 8): "We have considered whether any part in the spread of ovine abortion is attributable to the ram. It seems most improbable that a ram could spread infection mechanically from ewe to ewe in a flock merely from the fact of having been contaminated by an aborting ewe, because in the great majority of cases both rams and ewes, when the breeding season begins, have been excluded from sexual intercourse for nearly a year, and the ewes must have been free from maternal duties other than suckling for about six months. There seems only to be the possibility that a ram from infected premises may be a carrier of infection owing to the upkeep in some way of virus in its body, but of this being actually the case there is no evidence of any consequence."

The following short note seems to be worthy of record, since it would appear to furnish some evidence, bearing upon the last paragraph of the Committee's well-reasoned statement, and in support of the contention of many that the ram does in fact play a part in the spread of this disease. It is not claimed to represent an exhaustive investigation or to establish definitely any new conception, but it may serve to stimulate other enquiries along similar lines by those to whom material is available, and so lead to the evolution of corroborative facts or to show that this occurrence was in the nature of an accident and was therefore of no material moment.

History of the Outbreak of Ovine (Vibrionic) Abortion at the Field Laboratories, Cambridge

Twenty Leicester ewes were purchased from a neighbouring farmer for experimental purposes on October 11th, 1926. Subsequent enquiry elicited the statement that there had been no cases of abortion among these or any other ewes upon his premises during his occupancy—a matter of eight years. For the purpose of the experiment for which they had been acquired the 20 animals were divided into two equal batches, and placed in fields at opposite ends of the estate, nearly a quarter of a mile apart, in neither of which sheep had been kept for a number of years. One batch was run with a Border Leicester tup purchased in Northumberland the previous year, and the other batch with a Suffolk tup purchased from the same farmer from whom the ewes had been obtained.

Three of the ewes which had been running with the Leicester tup aborted near full term on March 5th and April 8th and 16th, 1927.

None of those running with the Suffolk tup aborted.

The tups had been removed from contact with the ewes after about two months, and in the meantime had been run with two other groups of ewes which had been on the premises the previous lambing season, and had not aborted previously, nor been in contact with other sheep. One of these ewes which had been tupped by the Border Leicester tup aborted two early fœtuses on April 20th, 1927.

The Border Leicester tup died in April, 1928.

The fœtuses from the first three ewes were expelled a few weeks before full term. They were well developed for their age, and there was an entire absence of putrefaction, indicating that there had been no considerable period between the opening of the uteri and the expulsion of their contents. The condition of the fœtuses led one to believe that they had not been dead for any length of time.

The fœtuses from the ewe in the second batch tupped by the Leicester tup and aborted on April 20th were also quite fresh, and did not appear to have been long dead.

Microscopic examination of fresh preparations from the placentas of the ewes which had aborted showed large numbers of small actively motile organisms. Pure cultures of similar organisms were obtained from the heart blood and stomach contents of all the fœtuses.

Morphology.

The organism stained readily with watery solutions of the basic aniline dyes, but did not hold the stain when treated by Gram's method.

Single elements were regularly comma-shaped, but "S"-shaped and spirillar forms, consisting of from three to six elements, were plentiful in fresh material. The individual organisms were 3μ-4μ in length by ·3μ-·4μ in breadth. Single elements appeared to be more actively motile than the longer forms. When stained suitably a single delicate terminal flagellum measuring from two to four times the length of individual organisms could be demonstrated. While unipolar flagella predominated many vibrios appeared to have a flagellum at each pole. These may have been forms which were about to divide. Occasionally in the

* Reproduced from the First Report (1929-30) of the Director, Institute of Animal Pathology, University of Cambridge, pp. 47-51.

case of the spirillar forms lateral flagella were observed.

One or more deeply staining granules were usually present in the organisms. In the case of individual elements a single granule was frequently observed at or near one end. In some instances the vibrios, especially the longer forms, had a distinctly beaded appearance. Similar granules were found free in fresh material and in artificial media. The significance of these granules is not readily ascertained. They can scarcely be regarded as performing a similar function to spores since they are no more resistant to heat or desiccation than are the vibrios—neither can they be accepted as representing a resting stage of the organism since, although they may be readily separated from material in which they are present in a free form by filtration through Berkefeld and Chamberland L candles, it has been found exceedingly difficult to obtain vegetative forms from such filtrates in artificial media. Further, if large numbers of vibrios from a young, actively growing culture are injected intravenously, examination of the blood 12 hours later shows numbers of granules and relatively few vibrios. A similar but less marked result is obtained when a young culture of the organisms is added to nutrient broth containing a small quantity of fresh blood. On the other hand, flagellated granules have been observed in stained preparations and actively motile granules in blood and other fresh preparations. This fact renders doubtful the suggestion that all granules can be regarded as the products of degenerative changes.

Artificial Cultivation.

Primary cultures were obtained with facility when the inoculum consisting of material from the placentas or stomach or tissues of the fœtuses was sown on the surface of serum agar, in glucose broth or in meat tubes and maintained under ærobic conditions. Sub-cultures of the organisms, which were without fresh material, were obtained more readily under partially anærobic conditions. Excellent growths have been secured on freshly prepared glucose-agar slant and on fresh-blood-agar slants.

In glucose-agar and in gelatine-agar shake cultures a zone of growth appears in from two to three days at a depth of $\frac{1}{4}$ to $\frac{1}{2}$ an inch below the surface of the medium.

The most suitable medium, especially for preserving the organism, consists of peptone broth containing minced meat. In this medium sub-cultivation is only necessary at monthly intervals, while in the case of all solid media it is advisable to sub-inoculate at intervals of not more than a week except, of course, in the case of organisms which have become well established in artificial media.

Growth is scanty on potato and very poor in peptone water. Indol is not formed. Gelatin is not liquefied.

It appears almost certain that the vibrio is identical with that described by M'Fadyean and Stockman working on behalf of the Departmental Committee, and proved by them to be the causal agent in widespread outbreaks of ovine abortion. The slight differences mentioned herein are probably to be accounted for by modifications in the technique employed.

Agglutination Tests.

The sera of ewes which had aborted agglutinated the vibrio in dilutions from 1 to 32 to 1 in 64, while that of the Border Leicester tup agglutinated in a dilution of 1 in 16. The sera of six normal control ewes failed to agglutinate in a dilution of 1 in 8.

Animal.	1 : 8	1 : 16	1 : 32	1 : 64	1 : 128	1 : 256
Ewe aborted	++++	++++	+++	+	—	—
Ewe aborted	++++	+++	++	±	—	—
Ewe aborted	++++	+++	+	—	—	—
Ewe aborted	++++	+++	+	—	—	—
Ewe normal	—	—	—	—	—	—
Ewe normal	—	—	—	—	—	—
Ewe normal	—	—	—	—	—	—
Ewe normal	—	—	—	—	—	—
Ewe normal	—	—	—	—	—	—
Ewe normal	—	—	—	—	—	—
Leicester Tup	++++	++	±	—	—	—

Some weeks later the four ewes which had aborted were turned into a small paddock along with 14 healthy ewes which had lambed normally and whose serum failed to agglutinate the vibrio in a dilution of 1 in 8. Six months later the blood of the 18 animals was tested again when it was found that ten gave a definite agglutination at 1 in 40, seven at 1 in 20, and one a trace at 1 in 20.

The blood of normal sheep used as controls did not agglutinate the vibrio at 1 in 10.

The 18 animals were bred from the following year (1928) and none aborted.

Animal Experiments.

Owing to the limited number of pregnant ewes available by the time the vibrios had been isolated and good growths obtained in artificial media the attempt to reproduce the disease experimentally was confined to only three animals.

A Dorset ewe (No. 27) which had been tupped by a Suffolk tup towards the end of September,

1927, received an intravenous injection of 5 c.c. of a broth culture of the vibrio on October 27th, and aborted one fœtus on November 30th. Vibrios were recovered from the uterine discharges and in pure culture from the stomach of the fœtus.

Two other ewes received 50 c.c. and 75 c.c. respectively of a young culture of the organism in broth by the mouth. Both produced healthy lambs at full term (March 11th and 14th, 1928). Vibrios were not found in the uterine discharges or in the fœtal membranes.

The Tup

As stated already, the Border Leicester tup died in the early part of April, 1928. The cause of death was not ascertained. In the course of the routine bacteriological examination an organism was recovered uncontaminated in cultures prepared from the heart blood and from the liver, which was identical with the vibrio obtained from the aborted material of the ewes he had served during the 1927 season.

Two pregnant Dorset ewes (Nos. 13 and 15) which had been tupped in the early part of January, 1928, by a Suffolk tup received 10 c.c. each of a broth culture of the vibrio recovered from the Leicester tup intravenously on April 14th. One of the ewes aborted two fœtuses on April 28th, and the other two fœtuses on April 30th.

Vibrios were recovered in pure culture from the stomachs of all the fœtuses.

Agglutination tests put up with the blood of these ewes before they were infected against antigens prepared from the vibrio isolated from the ewes which had aborted originally and from the vibrio isolated from the tup were negative, there being no agglutination at a dilution of 1 in 10. Similar tests, carried out one month after aborting, gave a definite positive agglutination at a dilution of 1 in 80 in both cases.

From the foregoing observations there is evidence that the tup harboured in his body a vibrio which was capable of producing abortion in healthy pregnant ewes when introduced under experimental conditions. There is also circumstantial evidence which suggests that he was capable of disseminating infection with the vibrio under natural conditions.

THE HEREDITARY CHARACTER OF SIDEBONE

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(*Continued from page* 90)

Family 4

This family shows a considerable amount of unsoundness, more particularly in the descendants of 4·1, which is the main representative, and 27·5 per cent. sidebone is revealed in his progeny, as shown in following table:—

Table Showing Unsoundness in Family 4.

Sires.	Sons.		G-sons.			GG-sons.			GGG-sons.			GGGG-sons.			GGGGG-sons.			Total.		
	Examined.	Unsound.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.
*4·1 }	—	—	5	3	60·0	14	5	35·7	49	16	32·6	23	2	8·7	—	—	—	91	26	27·5
4·2 }																				
4·3	1																	1		
4·4									2			4			7	3	42·8	13	3	23·0
Total	1		5	3	60·0	14	5	35·7	51	16	31·4	27	2	7·4	7	3	42·8	105	29	27·6

* After compiling the Tables 4·1 and 4·2 were found to be the same horse, also 4·11 and 4·12 were the same, and 4·16 and 4·21.

It is possible that a considerable amount of the unsoundness, if not introduced by, was accentuated through, the female side. In the first branch of the family (shown through 4·11

Sir Gomer Berry has just sold from his Pendley herd of Scotch Shorthorn cattle the bull "Basildon Rosicrucian" for 2,000 guineas to Messrs. Dalgety and Co. for shipment to Australia. The bull was bred at Pendley stock farms, Tring, and was awarded the supreme championship at the Royal Show at Manchester in 1930. His sire, "Millhills Rosicrucian," was sold from the Pendley herd for 3,500 guineas, also for shipment to Australia, in 1929. His dam is one of the Miss Ramsden family, and her grand-dam was bred by Captain John MacGillivray and was purchased for 900 guineas.

and 4·12 the same horse)—it can be shown that unsoundness was present in the blood of some of the dams:—

4·1112 which left one unsound son, was from a mare by an unrecorded son of 22.
4·11151 was from a mare by a son of 22·1, and the granddam by the same son of 22 as in the preceding pedigree.
4·124 was from a mare by 2·1, and the granddam was by 1.
4·125 was from a mare by 22.
4·1271 was from a mare by a grandson of 3.
4·12641 was from a mare by a grandson of 1.
4·12645 was from a mare by a grandson of 1.
4·128115 was from a mare by 3·101, whose only son examined was unsound.
4·12911 was from a mare by 17·2211, which was sound, but whose sire was unsound.
4·12917 was from a mare by a grandson of 3, and the granddam was by 22.

4·131 is an unsound line, probably through his dam by a son of 1. He left one sound and two unsound sons and ten sound and eight unsound grandsons.

The only pedigree traceable through the dam is that of 4·1315 from a mare by 22. Twenty-two, which so frequently appears in the above pedigrees, and is so often seen in unsound lines, is related to 1, as shown in the following outline:—

	Not examined	Not examined Family 1	
Not examined			Not examined Family 22
	Not examined	Not examined	

In the last branch of this family, *viz.*, 4·4, in which there are 13 representatives with three unsound, it is possible that unsoundness was introduced through the dams, for 4·4112311 was from a mare by 1·33 and the granddam by 38. The other two unsound members cannot be traced through their dams to any horse recorded in these tables. The two GGGsons were aged when examined and three of the four GGGG-sons were five years old or over.

4·2111—a son of 4·134 (N)—appears as the sire of a number of mares, which, though mated with sound stallions, threw unsound progeny. Only two of his sons and one grandson were examined and sound as three-year-olds.

Family 6

This is another short family. It is divided into two branches 6 and 6a, related to one another as follows:—

Not examined	Not examined	Not examined	Not examined 6
	Not examined	Not examined	Not examined 6A

From a study of the tables, one is led to believe that the family is sound, though there are not sufficient numbers recorded, nor can the pedigrees through the dams of the unsound ones be traced far enough to allow of a definite pronouncement. In the progeny of 6·11, six of the 12 sound horses are five-year-olds or over and the only unsound one is a three-year-old.

In other branches unsoundness is present in the dams of:—

6·1211 most probably by 9·128, a horse with ringbone.
6·13 most probably by a son of 3.
6·14111 from a mare by a half-brother of 1.

6a is evidently a sound line, for most of the horses examined were aged, and only one was unsound, *viz.*, 6a116. In this case, the dam was by an unrecorded horse, and the granddam by 3·1; from which the unsoundness probably came.

Family 7

This is the largest family dealt with, there being 871 representatives tabulated. Of this number 88, or 10·1 per cent., were found with sidebone. The unsoundness recorded is seen scattered through many generations, there being no line of descent in which it is predominant. The family may, therefore, be considered a sound one, and an analysis will show that most of the unsoundness found can be traced through the dams.

The table on opposite page summarises the unsoundness in this family; the table departs slightly from that of other families, inasmuch as sub-family 7·3 has been divided into branches 7·311 and 7·312 to 7·36. This is done for the reason that through 7·311 we have the largest branch of any family recorded.

The descendants of 7·1 show that five, or 9·09 per cent., had sidebone. Evidence that this may have been transmitted through the blood of the dams, is as follows:—

7·12111 was from a mare by a son of 3·1; very unsound line.
7·12102 was from a mare by 2·18, granddam by son of 3. „
7·12108 was from a mare probably by a son of 3.

7·12182 was from a mare by 7·492, which, though apparently sound, appears frequently in unsound pedigrees.

The dam of 7·121006 cannot be traced.

In the progeny of 7·2 we find 14·3 per cent. sideboned, the descendants of 7·21 showing none, though in the 13 examined many mature animals were seen.

7·22 shows four unsound descendants; of those which can be traced on the dam's side, 7·2216 and 7·2219 were from the same mare by 1·335—apparently a sound horse; only three of his sons were examined and they were sound. He is, however, a member of a very unsound family. The dam of 7·22107 was by 3·1, a very unsound

Table Showing Unsoundness in Family 7.

Sires	Sons.			G-sons.			GG-sons.			GGG-sons.			GGGG-sons.			GGGGG-sons.			Total.		
	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.
7·1	—	—	—	—	—	—	26	3	11·5	25	2	8·0	4	0	—	—	—	—	55	5	9·09
7·2	2	1	50·0	39	1	2·5	45	7	15·2	43	9	20·9	41	7	17·0	5	0	—	175	25	14·3
7·3	7·31					7·311				209	12	5·7	217	15	6·9	41	5	12·2	467	32	6·8
	7·312 to 7·36			4			8	2	25·0	54	3	5·5	9	1	11·1	—			75	6	8·0
7·4				17	7	41·2	36	8	22·2	32	4	12·5	6	0		1	0		92	19	20·6
7·5 to 7·7	3			3	1	33·0	1												7	1	14·3
Total	5	1	20·0	63	9	14·3	116	20	17·2	363	30	8·2	277	23	8·3	47	5	10·6	871	88	10·1

line. There is, therefore, presumptive evidence of the taint in this branch having come down through the female side, for ten of the 19 sound progeny were five years old at examination; had the sire been responsible, a greater number should have been found unsound.

7·231 shows 18 per cent. unsoundness in 30 of his progeny and of the 22 sound members, 39 per cent. were under five years of age when examined. The unsoundness appears to have come through 7·2311 (N), which was from a mare by 4·12 granddam by 3—the taint was probably carried to his sons, and accentuated by mating with mares of tainted breeding, for we find that of his unsound sons:—

7·23111 and 7·23112 were from dams by brothers not recorded in these tables.

7·23118 was from a mare by 9·311, an unsound line.

7·231103 was from a mare by 1·031, an unsound sire.

The remaining four unsound members cannot be traced through their dams.

Of the other unsound descendants of 7·23 a search through their pedigrees shows the following:—

The dam of 7·2314 was by 4·13, an unsound line.

The dam of 7·231215 was by 21·19, apparently sound; the granddam was 7·492, already referred to.

The dam of 7·231231 was by 3·3, an unsound line.

The dam of 7·231551 was by 1·031; she was also dam of 7·231103 above.

The dam of 7·231743 was by 9·51, a tainted line.

The remainder cannot be traced.

7·24 was unsound; his dam was by 1·1, the sire of a very unsound family. No sidebone was found in the 12 of his progeny examined; seven of them were three years of age or under.

7·25 was sound as an aged horse, 30 of his progeny were examined and only one, *viz.*, 7·254 was unsound as a four-year-old; the dam of this horse was by 2·2102, an unsound horse. Fifty per cent. of the sound progeny of 7·25 were four and five years old at examination. This appears to be a clear case of unsoundness being introduced into a sound family through the dam.

None of the sons of 7·311 was examined, but in 209 of his grandsons 5·7 per cent., or 12 only, were found unsound. Unfortunately the dams and granddams of a number of these cannot be traced far enough to connect with sires of these tables. Ten of the sons of 7·3112 were examined; three were unsound. Of these, 7·31124 was from a mare by 3·2—an unsound horse; the remaining two cannot be traced. Perusal of the table shows that four of the seven sound sons were five years or over when examined, and as 7·311 was known to be a sound horse in Scotland, there is evidence that 7·3112 is a sound horse.

In the progeny of 7·3113, there are two unsound—one grandson and one great-grandson. The dams of these cannot be traced, but as there are 32 horses recorded as sound, one cannot think other than that the line is a sound one, and that the unsoundness recorded is not hereditary on the sires' side.

No unsoundness is found in the progeny of 7·3114 or 7·3115 in 25 horses examined.

Sixty-eight descendants of 7·3116 have been examined; 47 of these were sons of 7·31161 (N) and three were unsound and 18 were grandsons and four were unsound. Pedigrees can be traced on the dam's side in the following cases:—

The dam of 7·311610001 was by 1·1021, an unsound horse; the granddam was by 3·1, of unsound family.

The dam of 7·31161004 was by 7·3112, previously referred to and apparently sound; the granddam was by 3.

The dam of 7·311610005 was by 3 2, of unsound family.

The dam of 7·3116182 was by 7·2311, previously referred to, who was out of a mare by 4·11; granddam by 3.

The dam of 7·3116185 was by 2·526, apparently sound; the granddam not recorded.

The dam of 7·31161032 was by 1·815; a horse sound as a five-year-old but with no progeny examined; granddam not recorded.

Forty-three descendants of 7·3117 are recorded, and only two are unsound, *viz.*, 7·311704 from a mare by 4·42111, which appears frequently in unsound pedigrees, and 7·3117001, which cannot be traced on the dam's side.

7·31101 was apparently sound; 27 of his sons were sound and three of his ten grandsons were unsound. The majority of those examined were mature horses, and if unsoundness was present as a factor on the sire's side in this generation, it would have undoubtedly shown in some of his sons. In the case of the unsound grandsons, the dam's breeding cannot be traced.

7·31102 shows three sideboned horses out of 12 examined. The percentage is large. This horse has a reputation of being sound. This is probably so, for the unsound sons were from mares with the following breeding:—

7·311022 was from a mare by 7·2315 (N); the granddam was by 4·11, of unsound line.

7·311026 was from a mare by 4·1263, a grandson of 4·11.

7·3110204 was from a mare by a son of 3.

7·311031 shows one unsound son out of ten examined; he was out of a mare by 4·11; the granddam was by 7·231.

The next son of 7·311 to consider is 7·31104. He had 41 sons and two grandsons examined; one son had sidebone, *viz.*:—

7·3110408 was from a mare by 2·18, which left three sound sons four years of age or under and one unsound at three years; the granddam by 9·51, of unsound line.

As 11 of the sound sons were five years old or over, and eight were four years when examined, there can be little doubt that the unsoundness was introduced through the female side.

The next family worthy of comment is that of 7·311004. Forty-seven descendants were examined and two sons and two grandsons, or 8·5 per cent., were sideboned. There were eight four-year-olds and 19 five-year-olds or over examined, and sound; if unsoundness was a dominant factor on the sire's side, it should have appeared more frequently. The inference is that the line is sound, and the introduction of unsoundness is, no doubt, due to other blood. A search of pedigrees shows that:—

7·311004005 was from a mare by 3·153, sound as a three-year-old but of unsound family, and whose only son examined was unsound.

7·311004008 was from a mare by 4·11 already referred to; the granddam was by 22.

7·31100461 was from a mare by 3·101 of unsound line, and whose only son examined was unsound, granddam was by a son of 1.

7·31100467 was from a mare by 7·31104, and the granddam by a son of 3.

There is, therefore, sufficient reason for unsoundness appearing in these members.

The remaining descendants of 7·311 show 8 per cent. unsoundness in the 74 members examined. The dams of those unsound ones which can be traced show as follows:—

The dam of 7·31100811 was by 7·231.

The dam of 7·311008102 was by 4·42111; the granddam by 4·1222 (N), a grandson of 4·11.

The dam of 7·31100945 was by 9·312; the granddam by a grandson of 1.

The dam of 7·31100909 was by a son of 3·1.

The dam of 7·311000142 was by a son of 6a; the granddam by 4·42111.

The dam of 7·311000143 was by 1·0541.

Unsoundness runs through most of these lines, and its appearance in these horses is not surprising.

Passing to a consideration of the descendants of 7·312 to 7·36—8 per cent. unsoundness is recorded, and that the dams are tainted can be shown in the following cases:—

The descendants of 7·312 were all sound.

The descendants of 7·313 were sound with two exceptions, *viz.*:—

7·31331, which was from a mare by a grandson of 1, and 7·31332, whose dam's pedigree is incomplete.

7·331133 was from a mare by 7·24, an unsound horse; the granddam by 1·33; the great-granddam by 38.

7·4 shows 20 per cent. unsoundness in the five generations recorded. That this was not a dominant factor on the sire's side may be reasoned from the fact that five aged sons of 7·41 were examined and found sound and two were unsound.

One of these, 7·4101, was from a mare by 9·3, of unsound family; the other cannot be traced. Of the grandsons of 7·41, 7·4147 was from a mare by 1·15, of unsound blood; the sound ones were all of mature age.

Three sons of 7·42 were seen, and were all unsound. This unsoundness could not have originated from 7·4, for a study of the age of his descendants shows that 38, or 52 per cent., were sound at five years of age or over. It may have been introduced through 7·42 himself, whose dam's pedigree cannot be traced. It is more likely to have come from the dam's side of the three sons, for two of them, 7·421 and 7·423, can be shown to be by the same horse, a son of 3·2, of very unsound blood.

7·492 has been referred to in dam's pedigree—15 of his progeny in four generations were examined and only one was unsound. Eight of them were only three years old.

It is thus seen that there is every support to the opening statement that the family, considered from the sire's side, may be regarded as sound, and that the unsoundness present has been introduced from tainted female sources.

Family 9

This family has been referred to on numerous occasions as being the probable source from which unsoundness has been transmitted to

sound lines through the dams. One hundred-and-ninety-four descendants have been examined, and 43, or 22 per cent., found to be sideboned. Most of this unsoundness is found in the branch with 9·3 at the head.

The table for the whole family is as follows:—

Sires.	Sons.			G-sons.			GG-sons.			GGG-sons.			GGGG-sons.			GGGGG-sons.			Total.		
	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.
9·1	—	—	—	10	1	10	22	3	13·6	—	—	—	1	1	100	—	—	—	33	5	15·1
9·2	2			1															3		
9·3				7	5	71·4	33	7	21·2	33	10	30·6	33	5	15·1	1			107	27	25·3
9·4				1	1	100													1	1	100
9·5				1			26	6	23·9	13	2	15·3	8	1	12·5				48	9	18·3
9·6							2	1	50										2	1	50
Total	2			20	7	35·0	83	17	20·5	46	12	26·0	42	7	16·6	1			195	43	22·1

Fifteen per cent. of the progeny of 9·1 is recorded as unsound. In the few representatives, *viz.*, 33, which have been examined, ten were grandsons and of these one was unsound; 22 were great grandsons and three were unsound. As 30 per cent. of the sound progeny were five years of age or over at time of examination, it is probable the branch is a sound one, with sidebone introduced through the dams. The unsound grandson, 9·127, was from a mare by 4·13, a sire of an unsound branch which has been noted on previous occasions as the possible source of unsoundness, whilst of the great grandsons—

The dam of 9·1211 (U) was by 7·2317, a member of an unsound branch.

The dam of 9·1212 was by 1·331, not examined, the sire of one sound and one unsound son and two unsound grandsons.

The dam of 9·1215 was by 3·1.

Two sons of 9·11 were examined; they were both sound. This branch was referred to in the first part of this article as being possibly responsible for the introduction of soundness into the very unsound family of 16.

Through the branch with 9·31 at the head there is a large amount of unsoundness. This stallion was not examined, but five, or 71 per cent., of his seven sons examined were affected with sidebone, and many mares by him are known to be affected.

It is interesting to follow the family of one of his sons, *viz.*, 9·312, himself not examined. Fourteen sons of this horse were examined, and only one was found unsound. Fifty per cent. of the sound animals were of mature age at examination; therefore it would appear that we have a sound branch of an unsound line to consider, and that the soundness has been introduced into it. This evidently occurred through 9·312, which was from a mare by 7·4, a horse not examined, but apparently sound, and soundness appears dominant in the progeny of 9·312.

Following the line through one of his sons, 9·3127, we find that 15 of his sons, *i.e.*, grandsons of 9·312, were examined, and that seven of them, or 46 per cent., were unsound, and most of the sound ones were not of mature age; unsoundness appears as the dominant factor in this generation. 9·3127 was not examined, and he may have been unsound; it is more than likely that he was, for he is carrying the unsound blood of 9·31, and was from a mare by 38, previously referred to as appearing frequently in unsound pedigrees. Therefore we may assume that the combination of blood has caused unsoundness to prevail in this branch. Only one in the generation was aged and sound at examination, *viz.*, 9·312705, and as he was from a mare by 7·41 of sound line, the factor for soundness would again become dominant.

Forty-eight descendants of 9·5 were examined and 18 per cent. unsoundness is shown. All of this is in the 38 progeny of 9·51 which was from a mare by 1—the sire of an unsound family. Twenty of his grandsons were examined and six were unsound; of the sound ones nine were three years of age or under. A considerable amount of the unsoundness is counteracted through 9·512 (N), which was by 2·5, of sound blood, and so seven mature sons from nine examined are found sound, but when again meeting unsound blood—as did 9·5122, whose granddam was by 3 and 9·5127, whose dam was by 9·3102, the sire of four unsound and two sound sons—unsoundness results.

There were five sound sons of 9·513, four of them being aged, and four sound grandsons and four sound and one unsound great grandsons.

9·521 is frequently seen in the pedigrees as the sire of dams of unsound horses by sound sires, yet no unsoundness is recorded in the six sons examined. It is possible that soundness

on the dams' side has counteracted the tendency (if any) to unsoundness from 9·521.

9·5212 was from a mare by 7·52, sound.
9·5215 was from a mare by 5·11, apparently sound.
9·5211 and 9·5213 from the same mare by a stallion not recorded in these tables.

There is another son of 9·52 not recorded in this family table, namely 17, which was proved to be 9·523 after the tables were completed. The notes on Family 17 therefore may be read in conjunction with this family.

Family 11

This is a short family with only 62 representatives, and, 16 or 25·8 per cent., are unsound. The analysis of the family is as follows:—

Table Showing Percentage Unsoundness in Family 11.

Sires.	Sons.			G-sons.			GG-sons.			GGG-sons			GGGG-sons.			Total.		
	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.	Examined.	Unsound.	Percentage.
11·1	—	—	—	—	—	—	16	1	6·2	14	2	14·3	2	—	—	32	3	9·37
11·2							4			21	12	57·1	3	1	33·3	28	13	46·4
11·3				1	—	—				1						2		
Total	—	—	—	1	—	—	20	1	5·0	36	14	38·8	5	1	20	62	16	25·8

It will be seen, by considering the full table, that the branch through 11·1 is a sound one. 11·111 has 15 sound sons and 12 sound and two unsound grandsons. One of the latter, *viz.*, 11·11111, can be traced to his dam only; she was by 2·526, apparently sound. If unsoundness was dominant in the blood of 11·111, there would not be so many mature horses sound at examination. The unsoundness present in 11·1121, the only horse examined in this branch, was possibly inherited from his dam; she was by 9·51, and the granddam carried the blood of 1 in her veins. Through 11·2, 46 per cent. show sidebone. 11·2111 was sound as a seven-year-old, yet of 21 sons examined, 12, or 57 per cent., were defective, many of them as three-year-olds, as are most of the sound ones. At first sight it would appear that 11·2111 must be responsible for such a high percentage of unsoundness, but analysis that can be made of pedigrees of the dams of his unsound sons, shows as follows:—

The dam of 11·21114 was by 22·2, an unsound line.
The dam of 11·21115 was by 2·217, whose sire was unsound.
The dam of 11·21116 was by 7·47; he was not examined, one son was, and found unsound.*
The dam of 11·21117 was by 2·219, an unsound horse.
The dam of 11·21119 was by 2·217 (N), whose sire was unsound.
The dam of 11·211101 was probably by a son of 1, of unsound family.
The dam of 11·211103 was by 2·1202, an unsound horse.
The dam of 11·2111002 was probably by a son of 38, of an unsound line.

Thus in eight of the 12 cases, the dams are of unsound blood. It is probable that 11·2111 carried the factor for unsoundness and when meeting the same factor on the dam's side, resulted in unsoundness as shown. The remaining short branches of the family show sound. The number of times the stallion 2·21 appears in the above unsound pedigrees is striking.

The remaining families dealt with have very few representatives and little comment is necessary in regard to them. Some of the members have been referred to from time to time as being present in dams' pedigrees.

It will be noted that the family numbers do not run in sequence. This is due to the fact that some of the families were found to be branches of others, and have been incorporated with them (Family 10 may be taken as an example; this was found to be a branch of 2), while many of them have only five or six representatives from which no data of value can be obtained, and have consequently been omitted. In all, 76 families have been tabulated.

Family 16

(Appears on first pages.)

Family 17

This family divides into two branches—that through 17·1 being apparently sound, and that through 17·2 very unsound. The former, with 12 representatives, shows no sidebone; of the nine representatives of the latter, six, or 66 per cent., are unsound. There would appear, therefore, to be little doubt that 17·2 was an unsound horse. Since the tables were completed evidence was obtained which shows this family to be a branch of 9. The stallion 17 is a son of 9·52, namely 9·523.

* 7·471 appears in the tables as sound; this is an error; he had sidebones.

Family 19

As there were 13 aged horses out of 15 in this family found sound and three unsound, it may be regarded as sound. The pedigrees of the unsound members cannot be traced through dams to representatives in these tables. Many mares by 19·5 have been seen, and they are always regarded as of a sound line. The unsoundness in the different branches is shown in the following table:—

Sire 19.	Generation.			
1	2	3	4	5
N. 5	S. 5	S. 1		
	U. 1	S.		
	N. 5	S. 6	S. 1	S. 1
		U. 2		
		N. 1	S. 1	

Family 21

Nine grandsons of 21 were examined, and three, or 33·3 per cent., were unsound, but as the sound members were all aged horses at time of examination, the factor of unsoundness is not strongly developed, if at all, and the family may be regarded as a sound one, with unsoundness introduced from mares. The pedigrees of the unsound members are not clear, but:—

21·11 appears to be from a mare by a brother of 11·21.

21·101 was from a mare by 7·4923, a doubtful family.

21·16 was by an unrecorded son of 9·5, a doubtful family.

Twenty great grandsons were examined and one was unsound and four great grandsons showed no unsoundness. The continuity of the examination is shown in the following table:—

Sire 21.	Generation.		
1	2	3	4
N. 1	S. 7	S. 11	S. 3
	U. 3	S. 1	
	N. 4	S. 7	
		U. 1	S. 1

Family 22

The relationship of this family to Family 1 has already been pointed out and frequent reference has been made to members of it, apparently introducing unsoundness into sound families through the female side of pedigrees. Of the progeny of 22, 28·5 per cent. of the 26 examined showed unsoundness. None of the sons or grandsons was seen, but four of the five great grandsons examined had sidebone; there is every reason to assume that unsoundness predominates in the early branches, and is becoming a diminishing factor in the later generations, as shown in the following table:—

Sire 22.	Generation.						
1	2	3	4	5	6	7
N. 5	N. 5	S. 1				
		U. 4	S. 1			
			U. 2			
			N. 1	S. 1	S. 2	S. 1
			S. 5			
		N. 3	U. 1			
			N. 1	S. 1	S. 6	
					U. 1	

Family 28

Appears in first pages.

Family 38

The founder of the Family 38 has frequently been referred to as being present in unsound pedigrees, but there are not sufficient members in this family examined to give a true indication of the degree of its unsoundness; 38 is reported by old breeders to have been "very rough." Nine members only were examined, and three, or 33 per cent., were unsound. 38·2 was one of the worst cases of sidebone I have ever examined. His dam was by a son of 1. From the character of his unsoundness, there is little doubt that he inherited the unsound factor from both sides. Only one son was examined—he was unsound. The dam of 38·3—sound as an aged horse—was by 17·1, which is a sire of a sound line, as far as can be seen. The dam of 38·6—sound when aged—was by a horse not recorded in these tables, but which appears on the dam's side of several horses that are sound, and at no time has he been noted in the pedigree of an unsound horse. It is, therefore, possible that in both 38·3 and 38·6 clean blood on the dam's side has counteracted the taint of 38, whilst 38·5 is recorded as the grandsire of one unsound.

Sire 38.			
S. 2			
U. 1	U. 1		
	N. 1	S. 1	
N. 3	S. 1		
	N. 2	S. 2	
		U. 1	

(*Concluded by Tables on succeeding pages*)

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(a)

TABLE SHOWING UNSOUNDNESS IN BREEDING LINES

N = not examined. S = sound. U = unsound.

Generation.	Sons.	G-sons.	GG-sons.	GGG-sons.	GGGG-sons.	GGGGG-sons.
Branch.						
1·1	S. 10	S. 10	S. 5	S. 1		
		U. 1				
	U. 10	U. 15	U. 6			
			S. 6			
		S. 11	S. 4			
			U. 2			
		N. 3	S. 1			
			U. 2			
	N. 1	S. 25	S. 1			
		U. 10	S. 2			
		N. 1	S. 1			
1·2	1·21	N. 1	S. 23	S. 12		
				U. 3		
			U. 16	U. 3		
				S. 3		
			N. 1	S. 1		
	1·22	S. 1	S. 2			
		N. 1	S. 4	S. 9		
			N. 5	S. 12		
1·3	1·31	S. 1	S. 2			
			U. 3	S. 1		
		N. 4	S. 28	S. 6		
				U. 3		
			U. 7	S. 4		
				U. 1		
			N. 3	S. 5		
				U. 1		
	1·32, 1·33	S. 1				
		U. 2	S. 10	U. 2		
		N. 5	U. 1			
	1·34	N. 2	S. 11	S. 2		
			N. 4	S. 10	S. 27	
					U. 3	
				N. 1	S. 1	
1·4, 1·7	N. 15	S. 23	S. 23	S. 1		
		U. 3				
		N. 15	S. 24	S. 3		
			U. 4	S. 1		
				S. 8	S. 13	
			N. 5		U. 4	
				N. 1	U. 1	
1·8	N. 2	S. 6	S. 34	S. 6		
				U. 1		
			U. 14	S. 3		
			S. 4			
		U. 1	U. 2			
			N. 2	S. 2		
				U. 2		
		N. 1	S. 2			
			N. 1	S. 2		
1·9	N. 17	S. 34	S. 24	S. 1		
1·003			U. 6			
			N. 2	S. 3		
		U. 3				
			S. 54	S. 70	S. 11	
					U. 1	
		N. 12		U. 9		
				N. 1	S. 1	
			U. 5			
			N. 15	S. 41	S. 8	
				U. 3		
	U. 1	N. 2	S. 2			
		S. 1				

(b)

TABLE SHOWING UNSOUNDNESS IN BREEDING LINES

N = not examined. S = sound. U = unsound.

Generation.	Sons.	G-sons.	GG-sons.	GGG-sons.	GGGG-sons.	GGGGG-sons.
Branch.		U. 1	U. 1			
	S. 1	S. 3				
	N. 12	S. 58	S. 85	S. 18		
				U. 1		
			U. 22	S. 5	S. 1	U. 2
				U. 2		
			N. 1	S. 1		
2·1			S. 9			
		U. 11	U. 1			
			N. 2	S. 3		
		N. 17	S. 47	S. 4		
			U. 9			
	S. 2	S. 1				
	U. 2	S. 7	S. 4			
		U. 5	U. 2			
		S. 7				
2·2	S. 14	U. 7	S. 6			
		N. 1	S. 1			
2·3 / 2·4	N. 2	S. 7	S. 2			
	U. 2	U. 2				
	2·51	S. 1				
2·5		U. 3	S. 3			
	2·52	S. 8	S. 12			
			U. 2			
		U. 2				
		N. 3	S. 5			
			U. 2	U. 2		
			S. 29	S. 3		
	N. 31	S. 51		U. 2		
			U. 4			
			S. 23	S. 1	S. 1	
		U. 36		U. 3		
			U. 15	S. 1		
			S. 26			
		N. 22	U. 15			
3·1			N. 1	S. 2		
				U. 2		
	S. 1	S. 2				
		S. 16				
	U. 3	U. 7				
		N. 1	S. 1			
		S. 6				
	N. 9	U. 1				
		N. 5	S. 10	S. 1		
3·2			U. 6	S. 2		
	S. 12	S. 17	S. 3			
		U. 3				
	U. 4	S. 7	S. 7			
		U. 2				
		S. 2	S. 1			
4·1	N. 2		U. 1			
		U. 3	S. 1			
		N. 10	S. 8	S. 6	S. 1	
				U. 4		
				S. 2		
			U. 4	U. 3		
				N. 1	S. 1	
				S. 25	S. 9	
			N. 17	U. 9	U. 1	
				N. 5	S. 10	
4·4	N. 1	N. 1	N. 1	S. 2		
				N. 5	S. 4	U. 1
					N. 3	S. 4
						U. 2
6	N. 6	N. 10	S. 21	S. 2		
			U. 3			

(c)

TABLE SHOWING UNSOUNDNESS IN BREEDING LINES

N = not examined. S = sound. U = unsound.

Generation.	Sons.	G-sons.	GG-sons.	GGG-sons.	GGGG-sons.	GGGGG-sons.
Branch.			N. 3	S. 2 U. 1 N. 1	U. 1	
		S. 1	S. 3 U. 1			
		U. 2	S. 1 U. 2	S. 1		
6A	N. 2	S. 1 N. 2	S. 6 S. 1 N. 2	S. 2 S. 2		
7·1	N. 3	N. 3	S. 23 U. 3 N. 5	S. 9 U. 1 S. 14 U. 1	S. 2 S. 2	
7·2	N. 4	S. 9 U. 1 N. 10	S. 24 U. 4 N. 1 S. 1 S. 16 U. 4 N. 8	S. 3 S. 1 S. 16 U. 2 S. 26 U. 11 N. 1	S. 4 S. 6 S. 1 S. 2	
	S. 1	S. 21 U. 1	S. 8			
	U. 1	S. 10	S. 2			
7·3	7·31	N. 1	N. 29	S. 198 U. 12 N. 28	S. 52 U. 7 S. 150 U. 8 N. 4	S. 1 S. 19 U. 5 S. 16
		7·312 to 7·316 N. 8	S. 3	S. 2		
		S. 4	U. 2 N. 5 S. 3	S. 4 S. 45 U. 3	S. 1 S. 7 U. 1	
7·4	N. 8	N. 9 S. 10 U. 7	N. 9 S. 10 U. 6 S. 11 U. 2 N. 1 S. 7	S. 12 N. 2 S. 5 S. 1 S. 9 S. 1 S. 1	S. 2 S. 3 S. 1	
8·1 to 8·5	S. 2 N. 8	S. 12 S. 12 N. 5	S. 2 S. 10 U. 1 S. 12 U. 1	S. 4 U. 1		
9·1 9·4 9·5 9·6	N. 8	S. 11 U. 2 N. 14	S. 1 S. 39 U. 10 N. 3	S. 6 S. 2 U. 2 N. 1 S. 3 N. 1	S. 6 U. 1 S. 1 U. 1	
9·3	N. 1	S. 2 U. 5 N. 9	S. 2 S. 1 U. 1 S. 22	S. 2		

(d)

TABLE SHOWING UNSOUNDNESS IN BREEDING LINES

N = not examined. S = sound. U = unsound.

Generation.	Sons.	G-sons.	GG-sons.	GGG-sons.	GGGG-sons.	GGGGG-sons.
Branch.			U. 6	S. 2 U. 1		
			N. 7	S. 19	S. 12 U. 3	
				U. 9	S. 1	
				N. 3	S. 16 U. 1	
11·1 ·2 ·3	N. 4	S. 1 N. 1	S. 19	S. 21	S. 4 U. 1	
				U. 14	S. 1	
			U. 1			
			N. 2	S. 2		
17·1	N. 1	S. 1 N. 1	S. 7 N. 1	S. 3 S. 1		
17·2	N. 3	U. 5	S. 3 U. 1			
19	N. 5	S. 5 U. 1 N. 5	S. 1			
			S. 6 U. 2	S. 1	S. 1	
			N. 1	S. 1		

McMASTER ANIMAL HEALTH LABORATORY

It will be remembered that in 1930 Mr. F. D. McMaster, of New South Wales, gifted £20,000 to the Council for Science and Industrial Research of the Commonwealth of Australia, to provide for the erection of a laboratory for investigating problems connected with animal health.

The November 20th, 1931, issue of the *Country Life and Stock and Station Journal* (Sydney), in the course of a detailed description of this Laboratory, the erection of which has now been completed, states "The F. D. McMaster Animal Health Laboratory is a two-storey brick building, with stone dressings, 155 feet long, and facing north, in a handy part of the grounds of the University of Sydney.

"On the ground floor the administrative offices, etc., are placed on the northern side, while all bacteriological laboratories are on the southern side where there is no direct sunlight. They are admirably situated for bacteriological work.

"Special features of the ground floor are the large white-tiled *post-mortem* room, fitted with a shadowless operating theatre light, and the insulated warm room, which will make it possible to dispense with a number of small incubators. There is also a dark room, fitted with all the latest appliances. On the ground floor also are four bacteriological laboratories. On the north side of the ground floor also there is a refrigerator room, fitted with a large refrigerator, the gift of the Graziers' Association of New South Wales. On this side, in addition, is a room for the accommodation of a delicate micro-photographic apparatus.

"On the top floor are the parasitology laboratories, of which there are three, these being similar to the bacteriological laboratories. Opening off one of the parasitology laboratories is an insulated warm room, which is fitted with a heating unit, and is provided also with Vita-glass windows. Through the provision of this room, it is hoped that workers will be able to continue certain parasitological work which is usually held up during the winter months, since in this room natural sunlight and warmth will at all times be available, and so this work will be able to continue unhindered.

"On this floor also is the library, in which the more important current scientific periodicals, in a variety of languages, are displayed. On the southern side is a long demonstration laboratory, which is fitted with dark blinds, in which micro-projection demonstrations can be given to students and others if required.

"A special feature of the laboratory is the light obtainable through the large windows, of which the whole lower half consists of one undivided sheet of glass, thus providing the optimum condition for microscopic work.

"At the present time there is a staff of seven actively engaged in research work in the laboratory, which maintains the closest co-operation with the Veterinary School of the University of Sydney, and the Department of Agriculture of New South Wales. Work has been in progress in the new laboratory for the past three months, and the experience so far gained has demonstrated that the laboratory is admirably suited in every way for the purpose for which it was intended."

* * * * *

Liverpool Corporation Health Committee recently had before it a report by the Deputy Veterinary Officer on a demonstration of pig slaughtering at the Sheffield Public Abattoir, with particular reference to a new method of securing anæsthesia by the use of an electric machine, the Electro-lethaler. The matter was referred to the Markets Committee for consideration and report.

The Veterinary Record

January 30th, 1932.

THE GREATNESS OF ESTATE

THEMISTOCLES, the Athenian, when desired at a banquet to touch a lute, replied that he could not fiddle but yet he could make a small town a great city. The kingdom of heaven is compared, not to any great kernel or nut, but to a grain of mustard seed, which is one of the least grains, but has in it a property and spirit hastily to get up and spread. So it is with the majority of movements and organisations which make for good order and efficiency. Small at the beginning, they grow to estate in accordance with the fostering care of those in authority at the head, and with the driving power of the rank-and-file behind exerted after the manner of a Roman cohort or solid phalanx. We may apply the simile to the National Veterinary Medical Association.

Formed on October 27th, 1882, as the outcome of a Congress held in London in July, 1881—210 members of the profession attending—its membership at the first Annual General Meeting in May, 1883, numbered 175. By 1900 it rose to a membership of 402, and in 1913 it had fallen to 362. In 1921 it took over the *Veterinary Record* as its official organ, the late Mr. William Hunting being the founder and moving spirit of that publication, and the membership of the Association rose from 372 to 1,115. Since that year the membership, reckoned on the occasion of subsequent Annual General Meetings, has gradually risen, as the following table indicates:—

Membership at date of Annual General Meeting in	1922 ...	1,362
,, ,, ,, ,,	1923 ...	1,434
,, ,, ,, ,,	1924 ...	1,493
,, ,, ,, ,,	1925 ...	1,518
,, ,, ,, ,,	1926 ...	1,532
,, ,, ,, ,,	1927 ...	1,590
,, ,, ,, ,,	1928 ...	1,614
,, ,, ,, ,,	1929 ...	1,622
,, ,, ,, ,,	1930 ...	1,631
,, ,, ,, ,,	1931 ...	1,662

BUT—and it is right that the word should be written in large capital letters—there are 3,432 Members and Fellows borne on the Register of the Royal College of Veterinary Surgeons, and less than half are members of the National Veterinary Medical Association. This is not as it should be, and it is a certain indication of laxity of purpose for proper professional progress and *savoir faire*. If greatness of estate is to be achieved, and if the power and status of the practitioner in veterinary medicine and surgery and of the veterinary scientist are to be maintained and improved, there must be no fiddling but, like Themistocles of old, a small town must be made into a great city.

It behoves every member of the profession to give this matter earnest thought, and to be up and doing. The advantages of membership of the National Veterinary Medical Association are manifold. It is the sword and buckler of the profession when battles have to be fought to uphold honour and status. It is an assurance of strong and rightful purpose; and its official organ, the *Veterinary Record*, the weekly issue of which is included in membership, is the profession's readiest medium in chronicling its progress administratively, technically in the publication of scientific papers of interest, and in every other direction whereby advancement is attained.

To those members of the profession who are unmindful of their obligations, or who have preferred to adopt the more expensive way of getting their weekly *Veterinary Record* through a local newspaper agent, we urge a change of front and a closing up of the ranks. Good resolutions fit in well with the beginning of a new year. May response to this appeal for further expansion foreshadow that strength which implies a greatness of estate. If every member of the Association would make it a special duty to enrol at least one other member such greatness would be achieved.

Clinical Report

HÆMORRHAGIC SEPTICÆMIA?

V. E. Pratt, m.r.c.v.s., and
T. N. Gold, m.r.c.v.s.,
Redditch

We beg to submit the following clinical record as being of interest to members in country practice.

On November 23rd of last year, the agent to the Earl of ——— purchased some hay from a local butcher as fodder for a herd of Guernsey cows, numbering twenty-five in all.

Six days previously the agent had purchased a young bull from the Channel Islands to be used for stud purposes. The bull arrived at the home farm on November 20th.

On November 28th a cow in the herd fell sick, showing symptoms of acute indigestion, with colic and tympanites, but recovered quickly following a draught of ol. lini. administered by the stockman. On November 29th a cow,

"Beauty's Pride," was taken ill, showing intense shivering, profound depression, anorexia, profuse diarrhœa. We were summoned to attend as soon as the condition was noticed. The temperature of the animal was 107° F.—the fæces were thin, watery and fœtid.

The herdsman blamed the hay at once and produced a sample. It was of the worst quality possible and contained a large percentage of weeds, which were later identified by Dr. Clough. These will be mentioned later.

Suspicion naturally pointed to the hay, especially as on the previous day a cow had developed the symptoms already mentioned. We stopped feeding the hay at once and isolated the affected cow, gave liq. strych. subcutaneously and tinct. chloroformi et morphini co. as a drench.

Later in the day an old cow, "Fantail," was taken ill with exactly the same symptoms. Her temperature was 106·8° F. They both lingered until December 1st, when death supervened.

Post-Mortem Examination.

"*Beauty's Pride.*"

No free peritoneal fluid.

No peritonitis.

Slight colitis—no appreciable enteritis.

Rumenal contents apparently normal.

Mucous membrane intact and normal.

Slight erosion of the mucous membrane of the abomasum.

Liver—friable and enlarged; very pale in colour.

Spleen—slight enlargement; capsule showed few ecchymoses.

Gall-bladder—distended.

Kidneys — macroscopically showed cloudy swelling; very friable with petechial hæmorrhages; capsule non-adherent.

Bladder—slight cystitis with erosion.

Uterus—normal.

Thorax.—Both lungs showed hypostasis—apex of the right lung solid; the middle lobe of the left lung was also solid. Several large ecchymoses in the right lung.

Pleura—showed petechiæ.

Pericardium—normal.

Heart—petechiæ on the endocardium.

Brain—although no nervous symptoms were observed, the meninges and cerebral tissue were examined out of interest but found to be apparently normal.

Lymphatic glands—those of the thorax and abdomen enlarged, œdematous and one or two slightly hæmorrhagic.

"*Fantail.*"

The second cow showed practically the same lesions as the above, with the following exceptions:—An intense abomasitis, enteritis and colitis. Both apices of the lungs were solid, with pleural exudate. Peritoneum showed petechial hæmorrhages. Spleen normal.

The *post-mortem* findings were of course those of a septicæmia, and portions of the lungs, spleen and abomasum were taken as material for microscopical examination.

On November 30th the old stock bull, "Sequel," was taken ill with the same symptoms as already mentioned.

We gave him Parke Davis' hæmorrhagic septicæmia vaccine in the suggested dose, but it was of no avail, and he died on December 3rd.

Post-mortem changes were those of a septicæmia. Local manifestations in the form of acute lobar pneumonia, and intense endocarditis.

"Golden Maggie" was taken ill on December 1st and died six days later. She received the vaccine.

"Lady Iris" was taken ill on the same day as "Maggie" and died on the 7th. She also had the vaccine.

Professor J. G. Wright kindly came over in consultation and agreed with the diagnosis of hæmorrhagic septicæmia.

The question arose, how did the outbreak start? Professor Wright suggested that the newly-introduced young bull, which stood next to the first animal affected, might have acted as a carrier, or that the hay might have been contaminated. He took a portion of lung tissue, which was examined microscopically by Dr. Tom Hare, who found the bipolar organism in considerable numbers.

Professor Wright suggested serum to check any further spread of the disease. We gave vaccine to the herd and with the two other cows showing symptoms—"Skinner's Fame" and "Pauline"—repeated the dose immediately the rise in temperature was noticed. "Skinner's Fame" died; "Pauline" had the high temperature and diarrhœa for five days, but recovered.

At present the remaining cows are in a state of health.

At the onset of the outbreak, we negatived anthrax and possible plant poisoning. Dr. Clough identified the numerous weeds contained in the sample sent to him and stated none to be poisonous. He also examined and made an analysis of the contents of the abomasum of one of the cows, but could detect no mineral or vegetable poison.

At present we are still undecided as to how the infection arose. Professor Wright favours the view that the bull acted as a carrier of the infection. The hay in question was off a field where the swillings of a slaughter-house ran.

The disease started in the cow "Beauty's Pride," which stood next to the bull, and was confined to one wing of the buildings. Cows and calves were fed with the hay in other sheds, but did not contract the disease. The old bull, however, was confined in a loose box not connected with the sheds.

We have met sporadic cases of hæmorrhagic septicæmia in young cattle in various districts previously, and have used the vaccine mentioned both as a prophylactic and curative agent with success.

On one farm in particular, the spring of the year brought a series of deaths in young cattle at pasture, but since vaccination no fatalities have occurred. It may be interesting to note that on this farm last spring a newly-purchased bullock developed an acute febrile attack with dysentery and œdema of the head and dewlap—temperature being 107° at the onset. Having met cases of septicæmia before on this farm, 2 c.c. of the vaccine was given on alternate days with success, the animal making a slow but steady recovery.

On another farm in the same district twelve cattle, six months old, turned out for the first time on May Day, were taken ill with high temperatures, brain symptoms and fœtid diarrhœa. In 12 hours five of the animals were dead. The remainder recovered with curative doses of the vaccine. Thirty other cattle of the same age on the same farm were vaccinated as a preventative and turned out with no fatalities. The heart blood from several of the dead cattle showed the bipolar bacillus to be present in large numbers.

In the case of the Guernsey cows no evidence of the disease had been recorded on the farm previously or no mysterious deaths of any description. The symptoms shown were atypical. As the disease progressed so did the severity abate, the last animal to be affected being attacked only mildly and responding rapidly to the vaccine.

There has been much controversy as to the occurrence of hæmorrhagic septicæmia in this country, certain observers stating that it is non-existent.

Hutyra and Marek report the disease to be prevalent in Austria, France, Germany and most European countries. They also state that "the sporadic cases as well as an enzoötic attack occur as a rule through infections of the soil, the causative agent in some localities acquiring a strong virulence through unknown influences, or they may be due to a diminished resistance of the animal."

THE VECTOR OF LOUPING-ILL

In addressing a special meeting of agriculturists in Aberdeen University, Dr. J. Russell Greig, the Director of the Moredun Institute, stated that the old controversy which has raged upon the question whether louping-ill in sheep was carried by the tick had now been settled. As the result of work carried out at the Moredun Institute, which had been principally in the hands of Mr. Gordon, Mr. Brownlee and Mr. Wilson, the bacteriologists, in conjunction with Dr. MacLeod, the entomologist, it had been definitely shown that the tick, *Ixodes ricinus*, engorged upon cases of louping-ill was capable of transmitting the disease when subsequently allowed to infest healthy sheep.

Abstracts

[**Neoplasms in Animals.** M'Fadyean, Sir J. *Jour. Comp. Path. and Ther.* Vol. xliv—Part 4. December, 1931. pp. 266-294. Figs. xxx.]

In this issue the editor commences a concise consideration of a subject upon which all our readers will wish to read him in full text, the more so as this is accompanied by a wealth of illustration of the characteristic macroscopic and histological appearances of neoplasms.

Accepting "Autonomous or independent new growths" (Thoma, 1894), as "probably as satisfactory a definition (of neoplasms) as any that could be constructed with the same number of words," the author proceeds to annotate his observation that the two outstanding characteristics of these growths are (1) their apparently spontaneous origin and (2) what has been called their parasitic habit, observing that, the latter notwithstanding, their cells "stand in relation to the commonwealth of the body like rebels."

A brief but absorbing section on the clinical characters of neoplasms, malignant and benign, and a note on their incidence in animals, are followed by an ætiological outline, in which examination is made of the two theories which hold the field at the present time—the microbial and the irritational. A masterly summary of evidence as to modes of causation precedes the statement: "It may be said that the weight of available evidence supports the view that the tumours which are only transmissible by transplantation are not caused by bacteria, and that those transmissible by cell-free filtrates are probably inflammatory growths caused by ultravisible viruses and should therefore not be included in the same category as the former, to which alone the term neoplasm should be applied. If this view be accepted it must be admitted that the actual cause of neoplasms has not yet been determined, although it would appear that sustained irritation by chemical and other agents is a factor in the causation of the carcinomata." Concerning heredity, it is even more difficult than in man to assess the importance of special susceptibility to neoplastic diseases transmitted thereby.

The remainder of that portion of the article now published is devoted to a consideration of the site of origin, histological structure and clinical features of the epithelial neoplasms—the carcinomata, the adenomata and the papillomata. W. B.

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[**Cattle Ringworm in Man.** Ashton, G. *The Lancet.* January 9th, 1932.]

It devolved upon the author to collate and summarise, at the instance of the Ministry of Health, the information obtained from a consultation of the literature and a special inquiry made

by the regional medical staff of the Ministry concerning the prevalence in this country of cattle ringworm in man.

Of the two groups of fungi causing diseases of the hair and skin in man, the microsporons, which are responsible for the common forms of ringworm of the scalp, are not (with unimportant exceptions) concerned with the ringworms of animals which are communicable to man. Of the tricophytons, *T. ectothrix* is the class which chiefly gives rise to disease in animals.

A consideration of the infection in animals, the facts of which are familiar to our readers, precedes a more extended treatment of the infection in man in which, as to incidence, the author states: "Eighty-eight of the 384 practitioners interviewed by the regional medical staff stated that they had not seen any cases of cattle ringworm in man. Of the 296 practitioners who had seen cases, 132 volunteered the statement that the disease rarely came under their observation, the number of cases seen varying from two cases in 25 years to five in one year. Several expressed surprise that, considering the large number of people exposed to infection, the disease did not come more often under their observation. The disease is commonest in persons who work amongst cattle, such as farm labourers. Farm workers who handle calves are particularly likely to be infected, the disease being, as already stated, very common in calves, especially during the colder months when they are confined indoors. Ringworm is not so common in milch cows, and for this reason milkmaids and dairymaids are not especially liable to contract the disease. Many cases of ringworm derived from horses and mules were seen in men attached to mounted units and transport services during the late war."

As contrasted with the commoner forms of human ringworm, the lesions of the animal variety affect more particularly the skin, and are peculiarly inflammatory in character; while the fact of contact with cattle obviously affected with ringworm is usually sufficient to settle the animal origin of the lesions.

While a few cases occur in which the disease is of long duration and wide-spread, most clear up in a few days, often without treatment.

Recommendations as to prevention are (1) the issuing of instructions to farm labourers, etc., as to the infectious nature of the disease; (2) the provision on the farm of suitable places for washing and disinfecting the hands of those who have been in contact with infected cattle; (3) the wearing of a washable overall whilst handling infected cattle and of a washable cap whilst milking; (4) calling attention to the danger of dressing sores, etc., on infected cattle with the naked hands instead of wearing india-rubber gloves—which should always be provided and worn for this purpose; (5) cleansing and lime washing all rubbing-posts, stalls, railings, gate posts, etc., with which it is known that infected cattle have been in contact; (6) preventing children kissing and fondling calves; (7) ensuring the observance of Article 13, of the Public Health (Meat) Regulations, 1924, which prohibits the "blowing" or inflation with the human breath of carcasses of calves slaughtered for human consumption.

W. B.

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Epidural Pernocton-narcosis in Dogs. Mikulec, J. (Thesis from the surgical clinic, Veterinary College, Brunn, Czechoslovakia) *Prag. Arch. f. Tiermedizin*, pt. B. Vol. 10 (1930): 346. Ex. *Vet. Med.* Chicago), January, 1932.]

Pernocton is a 10 per cent. solution of the sodium salt of the secondary butyl-B-bromallyl barbituric acid of the chemical formula $C_{12}H_{11}O_3N_2BrNa$. It was first employed intravenously and subcutaneously in human medicine. Later it was also introduced into veterinary therapeutics by Hinz (1927), Freese (1928), Lentz (1928), Berge (1929), and Westhues (1929), the use being by intravenous injection. At the request of the Director of The Clinic, Professor Dr. K. Pardubsky, the author examined the action of pernocton when injected epidurally according to the method employed and described by Pape and Pitzschk (1925) in the horse and by Zemaitis (1928) in the dog. Pernocton was injected epidurally, that is directly into the spinal canal between the first and second coccygeal vertebræ. The investigations were made upon 30 experimental dogs and in one dog for a cyst operation, one for Voronoff's rejuvenation operation and two dogs for demonstration operations.

Whenever possible, healthy experimental animals without organic defects were procured, without regard to age or state of nutrition of the animals. In one 10-year-old experimental dog, a pronounced arythmia of the heart was found before the injection. The experiments were so conducted that the pernocton, in a 10 per cent. solution, was injected epidurally in ascending doses. The initial dose was 1 c.c. Pronounced reaction was seen from it in all dogs. From injections of three to five c.c. (according to size of dog), motor paralysis of the posterior extremities occurred. The dogs swayed in the hind parts, and in some cases fell down. Sensibility was considerably decreased over the entire body, especially in the region of the hind legs. Complete narcosis, accompanied by profound anæsthesia, was obtained with 1 c.c. of a 10 per cent. solution of pernocton in a dog weighing 3 kgm. (that is 0·3 c.c., 10 per cent. sol., or 0·03 gm. substance per kilogram liveweight). In some instances narcosis set in during the injection. In other cases, complete narcosis did not occur until after five to seven minutes. In the latter cases, a short stage of excitation was observed. The dogs were unruly and whined before they fell asleep. During the narcosis the dogs remained perfectly quiet, they exhibited relaxed muscle tonus; the respiration was slowed down, regular,

easy and deep. The reflexes were in complete abeyance. In well-fed dogs the narcosis lasted from two to three hours. In worn-out dogs, narcosis lasted longer, even as long as seven hours.

In two dogs, permanent paralysis of the hind-quarters resulted from injections repeated four to five times. No improvement of the paralysis could be noticed even after prolonged observation. The paralysis may possibly have been due to a slight caustic action of the barbituric acid. Permanent injury to motility or sensibility as a sequel to a single epidural injection of pernocton has never been observed.

In a few dogs, the snoring reported by Berge and Freese was noticed. Vomitus, inspiratory dyspnœa and râles, mentioned by the same authors, did not occur in any of the cases. In some instances the pulse was somewhat accelerated. The fall of the body temperature as mentioned by Berge and Freese was striking in all cases. The deeper the narcosis, that is, the larger the amount of pernocton injected, the lower fell the body temperature, in some cases as low as 34° C. (93·2° F.). With the cessation of narcosis, the body temperature rose steadily. During one of the stages of excitation a moderate rise in body temperature was noticed.

No record of a noxious action upon the heart activity could be established. Whether the epidural injection of pernocton was made slowly or fast, no influence upon the depth and duration of narcosis resulted. A 12 to 16 hours duration of the narcosis, recorded by Berge from the intravenous injection, was not observed.

The observations recorded here lead the author to the conclusion that pernocton has excellent possibilities as a surgical anæsthetic for dogs, because it produces complete narcosis of several hours duration with relatively small doses. The epidural application of pernocton is easily achieved in the dog and has no harmful consequences. In the opinion of the author, this form of narcosis means a decided progress in canine anæsthesia.

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[Some Observations regarding Fodder-poisoning in the Horse. Burgi. *Tierärztl. Rdsch.*, xxxvii 489-492 (12 refs.)]

Two thousand, eight hundred and forty cases out of a total of 40,000 horses that passed through the cliniques of veterinary schools in Switzerland during the last 10 years ended fatally, and colic was responsible for not less than 375 deaths (13·3 per cent.) of all those incurable. In the majority of instances, inferior or deteriorated fodder was the immediate cause of death.

The author classifies fodder-poisoning in the horse under four headings, *viz.*: Those cases that are due to: (*a*) poisonous plants; (*b*) mouldy fodder; (*c*) fodder poisoning of bacterial origin; (*d*) fermenting feeding stuffs.

Ingestion of twigs, of yew, of colchicum, of darnel, of corncockle, and of ranunculaceous plants accounts for the majority of cases under (*a*).

Various kinds of mucor, of *Aspergillus*, and of Penicillium are responsible for the mouldiness of oats, hay, barley, straw, and of bread, and cause severe gastro-intestinal symptoms if such mouldy feeding stuffs are fed to horses.

Fodder poisoning of bacterial origin has been described by Graham, Brueckner, Pontius, Theiler and Robinson, and others, but the author, although he saw several cases resembling clinically the conditions described in the literature, failed to demonstrate or isolate the causal organisms in and from the organs and the blood of affected animals.

Fermenting fodder, particularly new hay, produces a severe inflammatory irritation in the gastro-intestinal tract. Various enzymes act as nerve poisons, and the animals die with symptoms of heart weakness, abdominal pulsation, and with signs of intestinal paralysis. The author, who saw five cases of such a nature, found that the hay remained toxic for three years —for it caused deaths among guinea-pigs which were fed on it at the end of that period.

H. F.

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[Duplication of Intestines in an Ox. Bogdaschew. *Tierärztl. Rdsch.* xxxvii. 481-482 (5 refs..) 1 fig.]

The author places on record a case of duplication of the cæcum, of the terminal part of the ileum, and of the first part of the colon in a three-year-old ox slaughtered at the Leningrad abattoir and the carcass of which was otherwise quite normal. The length of the duplicated parts and their relative position are described in detail. A short review of the scanty literature of the subject is also given.

H. F.

HUMANE KILLING OF HORSES

Just over a year ago the R.S.P.C.A. presented the authorities at the slaughterhouses at Vaugirard (Paris) with 14 humane killers and 80,000 cartridges, on the understanding that all horses brought to the Paris abattoir for butchery would be humanely killed. The society stipulated that their representative should have free entry to the slaughterhouses at all times, and that a municipal by-law enforcing the use of humane killers on all horses brought to the abattoir for butchery should be introduced. These stipulations were accepted. In recognition of the society's work, the Paris League for the Protection of the Horse recently conferred on Sir Robert Gower, M.P., chairman of the R.S.P.C.A., its highest award—namely, the prize of a Sèvres vase offered to the league by the President of the French Republic. The league also awarded the medal offered by the French Ministry of Agriculture to Captain E. G. Fairholme, chief secretary of the R.S.P.C.A., and the league's own medal to the society's Paris representative, Captain W. H. J. Harris.

Reviews

[**"The Vitamins."** H. C. Sherman and S. L. Smith. An American Chemical Society Monograph published by The Chemical Catalog Company, Inc. Price $6·00.]

The publication of a second edition to this volume on the vitamins is most welcome. The fact that it is one of the American Chemical Society Monographs is sufficient to guarantee its excellence, at least from the chemical point of view. The method of treatment adopted is most thorough; it consists of giving summaries of the most important papers upon each vitamin under the appropriate sub-headings and then usually a short discussion of the results of different authors is added at appropriate places. Each vitamin is treated separately except where earlier history confused it with another. The chemical, physical and physiological properties are described, together with a discussion of the relation of the vitamin to health and disease. Methods of quantitative assay are described; the occurrence and stability of the factors in different foods are discussed. An excellent bibliography of over 150 pages is appended.

The main drawback, from the clinician's point of view, is that in order to get a clear idea of, say, the chemical properties of a specific vitamin he will have to read through the whole historical development of the appropriate research. A short summary at the end of such a treatment would have enhanced the value of the book. It is natural that the book is already somewhat out of date, for it does not describe the recent advances in the preparation of vitamin D (as calciferol) nor does it give the recommendations for the standardisation of the vitamins suggested by the International Committee of the League of Nations. The recent work on carotene and vitamin A is described and discussed and it is clearly demonstrated that vitamin B is no longer an entity but probably consists of several components. Actually in this book vitamins B_1 and B_2 are described at length in separate chapters, whilst the probability that other factors exist is made clear in the context. The book is one that should have a strong appeal for those engaged in vitamin or any branch of nutritional research and it should prove useful to those whose main interest lies in the treatment of disease.

W. R. W.

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[Experiments on Pigs with Preparations of Vitamin D. Issued by Marsh & Baxter, Ltd.]

The object of this pamphlet, published by a firm of bacon curers, is probably an endeavour to improve the quality of pigs sent to them by farmers. It emphasises the importance of feeding adequate supplies of vitamin D to the animals, preferably in the form of green food. Two series of experiments are discussed and appear to support the advice finally given to the farmer. Actually, as scientific experiments, the results are valueless as no control animals were kept, nor are the numerical data sufficient to warrant making any scientific deductions. However, for the purposes of this pamphlet, the experiments probably serve their end.

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[**The Veterinary Journal.** Special Poultry Number. January, 1932. (Baillière, Tindall & Cox. 2s. net)].

Æsthetically-speaking, our contemporary is unreservedly to be congratulated upon the changes in format and paper introduced with the first issue of the year. Given an equal number of pages (as we are) a crown quarto journal is altogether a more impressive publication than the somewhat handier royal octavo production—but it just won't go into one's pocket! Moreover, with its more substantial paper our monthly is too bulky to fold. In one respect it is, therefore, to be hoped that in future the practitioner will find more time for home reading, now that the day is o'er when, with the *Journal* in one pocket and the *Record* in another, he was wont to await with equanimity the inevitable intervals of inactivity, what time the irons heated and/or the "extra hand" ambled in from the "off farm," a mile or more away.

The policy of producing special numbers on occasion is continued and, in view of the great and ever-growing importance of poultry husbandry to Great Britain in general and to the British veterinarian in particular, none can cavil at the appearance, within 18 months, of two issues devoted to poultry diseases.

The Managing Editor of the *Poultry World* (Mr. C. A. House) leads off with an effective "wake up!" addressed to our profession. Messrs. G. H. Warrack and T. Dalling have an informative contribution on neuro-lymphomatosis gallinarum—to which disease the attention of our readers was recently drawn by Dr. Bayon.

Other articles include: "Observations upon some Prevalent Diseases of Fowls" (D. C. Matheson); "A Hæmoglobinophilic Bacterium as the Cause of Contagious Catarrh of the Fowl" (L. de Blieck); "Poultry Pathology and Therapeutics" (Henry Gray); "Bacteria of the Enteric Group in Poultry"; (G. A. McGaughey); "Fowl Cholera in England" (G. H. Warrack and T. Dalling).

[Tierheilkunde und Tierzucht, Bd. 8, Eine Enzyklopädie der praktischen Nutztierkunde. Stang, Dr. Valentin. Professor Veterinary College, Berlin, and Wirth, Dr. David, Professor, Veterinary College, Vienna, pp. iv+730, 221 illustrations in text and 24 plates.]

The eighth volume deals with subjects from Pfeilgifte (arrow poison) to Schätzen (valuation) under 158 headings, some divided into several sections, each one the work of an expert on the subject. The following are treated at some length: the horse is dealt with at first generally, showing the development of the modern animal from earlier types, then by individual breed. Another lengthy article is on the care of the more important domestic mammals, more particularly those used for agricultural purposes. The article on Psychology is written by H. Dexler, of Prag, occupies 30 pages and has a good bibliography. The subject of breed is divided into two sections, the first on "Origin," by H. Kraemer of Giessen, and the second on "Characteristics," by E. Feige of Breslau. Measures for exterminating rats and mice are described by H. Raebiger, of Halle, and some 35 pages are devoted to scabies, under the joint authorship of L. Böhm and D. Wirth of Vienna and E. Wyssmann of Bern. The article on racing is written by K. Hutschenreiter of Vienna and K. J. Horn of Treunenbrietzen, and occupies 48 pages. This is followed by a short note on dog-racing by V. Stang. Rinderpest is dealt with by F. v. Hutyra of Budapest, Rontgenisation by F. Kral and glanders by E. Lührs.

As in the previous volumes a more detailed alphabetical index is included at the end, to supplement the shorter list of subjects given at the beginning of the volume.

Previous volumes have been reviewed in this journal (April 16th, 1927; January 28th, April 28th, and November 24th, 1928; June 29th, 1929 and November 29th, 1930). D. K.

ANIMAL DISEASE IN THE FREE STATE

Returns furnished to the Department of Agriculture show that the number of outbreaks of tuberculosis in animals in Saorstat Eireann for the 12 months ended December 31st, 1931, was 2,062, the number of animals declared affected being 2,115, including 129 in Co. Cork, Kerry 407, Limerick 495, Clare 109, Tipperary North Riding 65, South Riding 315, Waterford 84, Dublin Borough 29, Cavan 10, Donegal 80, Monaghan 1, Carlow 9, Dublin Co. 10, Kildare 30, Kilkenny 78, Leix 39, Longford 26, Meath 37, Offaly 12, Westmeath 22, Wexford 36, Wicklow 15, Galway 12, Leitrim 2, Mayo 45, Roscommon 7, and Sligo 11.

The number of outbreaks of scab in sheep for the period from January 1st, 1931, to January 15th, 1932, was 7, including two in Tipperary (S.R.) and one each in the counties Donegal, Kilkenny, Louth, Wicklow and Dublin Borough.

The number of outbreaks of swine fever from January 1st to 15th, 1932, was two, which occurred in Dublin Borough, involving the slaughter of six animals as diseased or suspected.

Report

[Surrey County Council. Chief Veterinary Officer's Report, 1930.]

The second annual report of the Chief Veterinary Officer of the County of Surrey deals with the work of the veterinary staff under the Milk and Dairies Acts and Orders and the Diseases of Animals Acts and Orders during the year 1930.

There has been no change since the previous year in the organisation of the staff. This consists of a whole-time Chief Veterinary Officer with four whole-time and seven part-time Veterinary Officers. The whole-time Veterinary Officers deal with the work arising under the Milk and Dairies Acts and Orders and the Tuberculosis Order of 1925, and the part-time Inspectors deal with the other diseases scheduled under the Diseases of Animals Acts.

There are 67,443 dairy cows in the county, distributed among 1,100 registered cow-keepers, and these cows are inspected four times a year by the whole-time veterinary staff. Careful palpation of all udders is carried out at these inspections. As a result, 601 cases of pathological conditions of the udder were detected, involving the prohibition of the sale of milk, and 39 of these were due to tuberculosis.

During the year 79 suspected cases were reported under the Tuberculosis Order, of which 41 were dealt with as coming within its scope. In addition, 101 cases were detected during the routine quarterly inspections. This total of 142 cases is classified as follows: "Milk and udder" cases, 47; "emaciation" cases, 17; "chronic cough" cases, 78.

Frequent milk sampling is practised in this county, 667 samples being taken during the year. Of these, 7·35 per cent. proved to be tuberculous. The 43 cows responsible were dealt with by slaughter.

The routine inspections of dairy cows, besides constituting a safeguard to the milk supply, are also of considerable educational value. The majority of cow-keepers welcome the inspection of their herds and show an increasing desire to co-operate with the Council's officials. This has produced a marked improvement in the methods of milk production throughout the county, particularly as regards hygienic conditions.

Apart from tuberculosis there was very little scheduled disease found amongst animals in the county during the year which fell to be dealt with by the Council's staff. Eleven cases of anthrax were reported, of which one only was confirmed. A case of suspected glanders in a polo pony at Ranelagh involved a considerable amount of mallein testing, as there had been contact during play with about 80 other ponies.

N.V.M.A. Divisional Report

NORTH OF ENGLAND DIVISION*

Election of Officers at Newcastle-on-Tyne

A meeting of this Division was held at Armstrong College, Newcastle-on-Tyne, on December 19th, 1931, when the chair was occupied by the President, Mr. W. H. Blackburn, and the attendance book was signed by the following:—Messrs. W. J. Young, Jarvie, W. L. Stewart, Isherwood, J. W. Rider, Wilkinson, Lightfoot, Nicholson, Snaith, T. M. Mitchell, Hicks, Taylor, Pickering, J. D. Peele, Callender, Perkins, C. Elphick, H. S. Elphick, Forbes, Irvin and J. R. Rider, Hon. Secretary. Dr. E. Tate and Mr. J. O. Powley were present as visitors.

Obituary.—At the outset the President made sympathetic reference to the lamented death of Mr. J. Davidson, Newcastle. Mr. Davidson, said the President, was one of the oldest members of the Division, a good counsellor, and a loyal friend. His loss was a severe one, and his place would be difficult to fill. Many members of the Division had attended the funeral, and a floral tribute and a letter of sympathy had been sent from the members. He now asked the meeting to express its condolence with the members of Mr. Davidson's family by standing in silent tribute.

The minutes of the previous meeting, having been published in the *Veterinary Record*, were taken as read, and confirmed.

Correspondence.—(1) Apologies for absence were received from the following:—Dr. Bradley, Principal Hobday, Messrs. R. Simpson and C. G. Hill.

(2) A letter from Mr. F. J. L. Croudace, asking for consideration to be given to a suggestion that meetings be held on some day other than Saturday was considered. This matter had previously been considered by the Council, who had decided to lay it before the general meeting, that the wishes of the majority of the members might be ascertained. After some discussion it was unanimously agreed that no change be made in the existing arrangements.

*Received for publication January 11th, 1932.

It was, however, finally proved that glanders was not present. During the year, three cases of equine parasitic mange occurred, and one case of sheep-scab. The latter originated from sheep brought from Shropshire.

One outbreak of foot-and-mouth disease and 52 outbreaks of swine fever were confirmed in Surrey during 1930, these being dealt with directly by the Veterinary Staff of the Ministry of Agriculture and Fisheries.

Reports of Council Meetings held on September 29th and December 5th.—In addition to the usual routine business, the Council had considered the circular letter from the Secretary of the Royal College of Veterinary Surgeons, relative to the proposed memorial to the late Major-General Sir Frederick Smith, and decided to recommend that the sum of three guineas be sent to the fund.

The Council had given careful consideration to the matter of Veterinary Treatment for the Sick Animals of the Poor, and presented an interim account of its deliberations. It was proposed to give reports of the future position as occasion demanded.

On the proposal of Mr. Mitchell, seconded by Mr. Taylor, the Council reports were received and adopted.

Reports by delegates to outside bodies.

(1) By Mr. H. S. Elphick, as follows:—

"Report on Working of Dispensary for Sick Animals of the Poor, 19, Vine Lane, Newcastle," December 1st, 1930, to November 30th, 1931.

1,972	attendances	...	Dogs.
571	,,	...	Cats.
29	,,	...	Ponies and Horses.
1	,,	...	Mouse.
2	,,	...	Rabbits.
6	,,	...	Tortoises.
2,581			
73	At Surgery.		
2,654	Total, December 1st, 1930, to November 30th, 1931.		
2,847	Total, December 1st, 1929, to November 30th, 1930.		

"The cases were, on and off, about the same as the preceding year, *viz.*:—distemper, cankered ear, skin diseases, eye diseases, pyorrhœa and extraction and scalings, interdigital abscesses, fractures, tumours (mammary and other forms), wounds of various kinds, sore backs and shoulders, lameness and stomach and bowel troubles.

"The costings, including laundry, surgeons' coats, gas and liberty of sign have amounted to £5 18s. 9d., and of drugs, dressings, etc., £19 1s. 11d., making a total of £25 10s. 8d. Against this the collecting box in the Dispensary has produced £26 2s. 10d., and donations have amounted to £24—a total of £50 2s. 10d.—leaving a balance on the right side of £24 12s. 2d. It will thus be seen that the Dispensary is self-supporting about twice over.

"Since the Dispensary has started the Flag Days have increased the collection made by the R.S.P.C.A. by over £200, so that it will be seen that the Dispensary is a great draw and a very distinct help to the funds of the Local Branch of that Society.

"The Dispensary has filled a distinct want, judging alone from the crass ignorance shown by "doggie men" in cases which have been treated by these "know-all" persons before being brought to the Dispensary: a distinct proof that professional knowledge is much needed—to say nothing of its application."

The report was received and adopted unanimously.

(2) By Mr. C. Elphick, in the following terms:—

"Report on the Work of the Special Committee of the Northumberland Agricultural Society.

"No full meeting of the Committee has been held during the year, but a highly important gathering took place at Cockle Park, on April 29th, 1931, when members of the special committee had the pleasure of meeting Professor Buxton, of Cambridge, the Earl Grey, of Howick, being in the chair.

"The whole question, but principally that of research into sheep diseases, was discussed, and several misunderstandings were cleared up.

"The County Committee selected to consider the proposal of a memorial to the late Duke of Northumberland was approached by Earl Grey, who suggested that a fitting memorial to the late Duke would be the establishment of an animals research station at Cockle Park, or elsewhere. The fund has not yet reached a financial state to warrant the immediate starting of research work, but it is probable that, under more propitious circumstances, it will be possible to achieve the desired object."

After some discussion, it was decided to add to the report the recommendation that the sum of two guineas be sent to the memorial fund for the late Duke of Northumberland. With this addition, the report was received and adopted.

(3) By the Hon. Secretary, on the work of the N.V.M.A. during 1931.

The report was received and adopted.

Mr. W. Lyle Stewart then introduced a brief discussion on "The Present Method of distributing Biological Products."

In his opening remarks, Mr. Stewart said that the matter referred to the methods adopted by commercial firms, and he demonstrated the differences in the terms accorded to veterinary practitioners and retail chemists. Several members stated their experiences, and after some discussion it was decided to send a resolution on the matter to the N.V.M.A., asking that body to investigate the question and to take such action as may be deemed desirable and possible. The Secretary asked to be supplied with the necessary data, and promised to sponsor the resolution.

Election of Officers.

The Council had given consideration to this matter, and now made recommendations as follows:—

President, Mr. H. Hicks; *Senior Vice-President*, Mr. W. H. Blackburn; *Junior Vice-President*, Mr. H. S. Elphick; *Hon. Auditors*, Messrs. F. Christopher and T. M. Mitchell; *Hon. Secretary and Treasurer*, Mr. J. R. Rider.

The nominations of the Council were put to the meeting and carried unanimously.

The election of two members of *Council* took place by ballot, as the result of which the President declared Messrs. T. M. Mitchell and T. Wilkinson duly elected. The thanks of the meeting were due to Mr. Powley for his courtesy in counting the votes.

Dr. E. Tate, Anæsthetist to the Royal Victoria Infirmary, Newcastle-on-Tyne, then presented his paper "On Anæsthesia and Narcosis."

[This paper is reproduced at the commencement of the present issue.—Ed.]

The President expressed his thanks to Dr. Tate for his excellent address, but said it contained so much valuable material that he felt it would be difficult, at this stage of the proceedings, to do full justice to it in discussion. If such a course were agreeable to Dr. Tate he suggested that the discussion be postponed till a later date. Mr. Jackson Young supported the President's suggestion and, Dr. Tate having agreed to the proposal, it was agreed that the discussion should form part of the Annual Meeting.

J. R. Rider, *Hon. Secretary.*

CONFUSING MILK DESIGNATIONS

Various local authorities are giving their attention to the question of milk designations.

At the last meeting of the Surrey County Council it was reported that the Public Health Committee were suggesting to the Minister of Health the desirability of amending the Milk (Special Designations) Order, 1923, because the present nomenclature of graded milks is misleading. They stated that most persons regard Grade A as the highest standard, whereas certified milk is first followed by Grade A (tuberculin tested), with Grade A third.

When Croydon Borough Council met on the 23rd ult. the Public Health Committee reported that "there is undoubtedly much confusion in the minds of the buying public as to the value of each grade, and this is increased by the marketing of various unauthorised grades, such as 'sterilised milk' or 'nursery milk' and milk sold as pasteurised but not under licence." The report added, "The present nomenclature of the graded milks is also confusing. 'Certified' milk, for example, conveys little to the ordinary purchaser, while 'Grade A' suggests that a milk so labelled is of the highest quality, whereas it is, in fact, the least safe of all the graded and designated milks. The committee was of opinion that raw milk supplies should be sold in the following classes only: First Grade or Grade A, to conform to the present standard of Grade A (tuberculin tested) fit for babies and young children; Second Grade or Grade B (not guaranteed tuberculin free) to conform to the requirements of the present Grade A; and ungraded milk to include all raw milk not sold as graded milk, this milk to be labelled, "Not fit for human consumption." It was also proposed that the sale of heat-treated milk not prepared under a licence issued by the local authority be prohibited; such milk to be designated pasteurised milk: and that local authorities should have power, on tubercle being discovered in any milk supply, to prohibit supplies from the farm concerned being sold for human consumption (unless prepared under a licence for heat-treated milk) until the affected animals are removed from the herd. The recommendations are to be further considered.—*Dairy World.*

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

DIARY OF EVENTS

Feb. 1st.—N.V.M.A. Editorial Committee Meeting at 2, Verulam Buildings, Gray's Inn, W.C.1.

Feb. 4th.—Meeting of the Central Division, N.V.M.A., at 10, Red Lion Square, W.C.1.

Feb. 4th.—Special Meeting of the Dumfries and Galloway Division, N.V.M.A., at Carlisle.

Feb. 5th.—Meeting of the Southern Counties Division, N.V.M.A., at Southampton.

Feb. 5th.—Annual Dinner-Dance of the North Midland Division, N.V.M.A., at Sheffield.

Feb. 11th.—Annual Meeting of the Lincolnshire and District Division, at Grantham.

Feb. 19th.—Annual Dance of the Royal Veterinary College, at the Hotel Russell.

Feb. 19th.—Annual Meeting of the Eastern Counties Division, N.V.M.A., at Ipswich.

Aug. 8th-13th.—N.V.M.A. Jubilee Congress at Folkestone.

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R.C.V.S. COUNCIL ELECTION

We give below the list of nominations of members for election to the Council of the Royal College of Veterinary Surgeons, received up-to-date. This list will accompany the foreign voting papers which are to be issued at the end of this month:—

Name	*Proposers*
Buxton, J. B.	Sir J. M'Fadyean. J. F. Craig.
Kirk, W. H.	F. T. G. Hobday. G. H. Wooldridge.
Locke, G. H.	J. W. Brittlebank. J. O. Powley.
M'Fadyean, Sir J.	J. F. Craig. J. Share-Jones.
Share-Jones, J.	Sir J. M'Fadyean. O. Charnock Bradley.
Sheather, A. L.	Sir J. M'Fadyean. J. W. Brittlebank.
Willett, J.	G. P. Male. O. Charnock Bradley.
Wooldridge, G. H.	O. Charnock Bradley. F. T. G. Hobday.

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R.C.V.S. FELLOWSHIP DIPLOMA

His many friends in the profession, both on the staff of the Ministry of Agriculture and elsewhere, will be pleased to hear of the recent success of Mr. George Eaton, of Hallaton, Market Harborough, in obtaining the Fellowship Diploma of the Royal College of Veterinary Surgeons.

The subject of his Fellowship Thesis was: "The Clinical Aspect of Differential Diagnosis of Diseased Conditions of the Mouth and Feet of Cattle, Sheep and Swine, with particular reference to Foot-and-Mouth Disease."

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PERSONAL

Pending Retirement of Mr. T. Eaton Jones.—It was reported to the Liverpool Health Committee on January 14th, that Mr. T. Eaton Jones, chief veterinary officer, will retire on superannuation at the end of April next.

Mr. Eaton Jones is the senior Corporation officer, having been in the service for 36 years, during 31 of which he has occupied his present post.

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OBITUARY

His wide circle of friends in the profession will learn with deep regret of the bereavement sustained by Mr. H. Tudor Hughes, F.R.C.V.S., of Oswestry, in the death of his wife, Mrs. Hilda Hughes, which occurred on January 16th, at the Northern Hospital, Liverpool. Mrs. Hughes, who was 44 years of age, had been ill for about three months. Recently she underwent a serious operation, and bore her illness with great cheerfulness and fortitude.

The eldest daughter of Mr. D. Stanley Owen, a well-known Swansea solicitor, Mrs. Hughes had resided in Oswestry since her marriage in 1912, with the exception of the war period, when she accompanied her husband to the Remount Commission in the United States. She also accompanied her husband when he was in command of the Veterinary Hospital in Marseilles after the Armistice. "In Oswestry Mrs. Hughes was widely known and respected, and her kind disposition had won for her a host of friends," says the *Border Counties Advertiser*. "She will be much missed by the Women's Section of the Oswestry Branch of the British Legion, of which she was a member, and also at the Oswald Road Presbyterian Church, where she attended."

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ARMY VETERINARY SERVICE

Movements of Officers

Major F. R. Roche-Kelly arrived home from China on December 29th, 1931; he is present on leave until April 15th next inclusive, and proceeds to Edinburgh for duty on April 16th.

Major K. S. Simpson arrived home from India on January 15th; he was posted to the Southern Command and is now doing duty at Larkhill.

Captain F. W. Goodall arrived home from India on January 15th; he is at present on leave India until March 14th, inclusive, and joins the Aldershot Command for duty on March 15th.

Major F. J. Andrews sailed for India on January 23rd, for a full tour of duty abroad.

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London Gazette—War Office—Regular Army.

January 26th.—Lieut.-Col. H. Gamble, O.B.E. F.R.C.V.S., having attained the age limit of liability to recall, ceases to belong to the Res. of Off. (January 15th).

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Territorial Army Reserve of Officers.

Major A. N. Foster, O.B.E., F.R.C.V.S., having attained the age limit retires and retains his rank, with permission to wear the prescribed uniform (January 27th.)

NORTH RIDING HORSE BREEDING

A reference to the influence of the Ministry of Agriculture on the standard of agricultural horses in the North Riding was made at the annual meeting of the Ryedale Heavy Horse Society.

Councillor George Wass, in his presidential address, spoke highly of the services rendered in this direction by the Ministry's officials in the district, who had done their best to help farmers in every way. The grants received from the Ministry had done a great deal to help the farmer, and specially small farmers, to make use of first-class stud horses on terms which they would be unable to afford unassisted.

The Ryedale Society was formed 18 years ago, and had been able, with the co-operation of the Ministry, to raise the class of working horses in the district. The members were now able to have the services of the finest sires in the country for fees which were comparable to those charged for what he called scrub horses privately travelled.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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THE N.V.M.A.: AN APPRECIATION

To the Editor of the Veterinary Record.

Sir,—I wish to put on record my appreciation of the action taken by the N.V.M.A. against the advertising methods of the unqualified practitioner, by means of a counter-advertisement in the local papers of this district. Such activity on the part of the N.V.M.A. gives the veterinary surgeon real cause to appreciate the worth of membership of such a body—among other causes.

In conclusion, may I suggest that such counter-advertisements should be continued in the same papers at suitable intervals?

Yours faithfully,

H. Awmack King.

14, College Road,
Harrow.
January 16th, 1932.

ALCOHOL INJECTION ALTERNATIVE TO NEURECTOMY

To the Editor of the Veterinary Record.

Sir,—Some time ago I saw a reference in a journal, maybe the *Veterinary Record*, regarding injecting alcohol over the plantar nerves in horses as an alternative to performing the radical operation of neurectomy. Unfortunately I cannot again trace the article in question.* Would someone do me the favour of describing in the *Record* the technique and the amount of alcohol recommended over each site? Also, what is the effect of this introduction—*viz*: (1) Does it cause a permanent subcutaneous tumefaction, bringing about nerve absorption by pressure but which might cause interference with free movement or a blemish, or does it cause a fibrosis with degeneration in the nerve itself only?

(2) Does it lead to complete and permanent loss of sensation in the limb below the injection?

(3) How long after injection is the effect produced and when can the horse resume work?

(4) In what way is it more advantageous than neurectomy?

Regarding the use of alcohol injections, I recently attended a cow which had a badly leaking teat due to having (sometime previously) had the point accidentally severed, thus loosening the sphincter. I injected 2 c.c. of absolute alcohol with a dental point syringe in two places at the teat point. This caused a fibrous thickening and now no leakage occurs on the road from the pasture or whilst the cow is awaiting her turn for milking. A leak does take place, however, if the milker commences on the other teats first.

Yours faithfully,

F. J. Dunning, f.r.c.v.s.

Stellenbosch, C.P.
January 4th, 1932.

* [The reference of which our correspondent writes was made in a report of the Aldershot meeting of the Royal Counties Division, N.V.M.A. (held on July 31st, 1931) which was published in our issue of September 5th, 1931, vol. xi, No. 36, p. 914.—Ed., *V.R.*]

Diseases of Animals Acts, 1894 to 1927

SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th January, 1932	18	25	—	—	9	16	30	99	28
Corresponding period in 1931	19	20	—	—	13	27	33	55	9
1930	20	21	—	—	24	32	72	91	30
1929	20	22	—	—	16	34	91	46	15

Note.—The figures for the current year are approximate only.